

Environmental Review Tribunal

Tribunal de l'environnement



ISSUE DATE: January 04, 2019

CASE NO.: 18-028

PROCEEDING COMMENCED UNDER section 142.1(2) of the *Environmental Protection Act*, R.S.O. 1990, c. E.19, as amended

Appellant:	Concerned Citizens of North Stormont
Approval Holder:	Nation Rise Wind Farm GP Inc., as general partner for and on behalf of Nation Rise Wind Farm Limited Partnership
Respondent:	Director, Ministry of the Environment, Conservation and Parks
Subject of appeal:	Renewable Energy Approval for Nation Rise Wind Farm
Reference No.:	0871-AV3TFM
Property Address/Description:	Various locations
Municipality:	Township of North Stormont
Upper Tier:	United Counties of Stormont, Dundas and Glengarry
ERT Case No.:	18-028
ERT Case Name:	Concerned Citizens of North Stormont v. Ontario (Environment, Conservation and Parks)

Heard: July 23-27 and 30-31, and October 15 and 16, 2018 in Finch, Ontario, and November 23, 2018 in Toronto, Ontario

APPEARANCES:

<u>Parties</u>	<u>Counsel/Representative⁺</u>
Concerned Citizens of North Stormont	Kathleen Coulter, Andrew Chachula and Eric Gillespie

Director, Ministry of the Environment, Conservation and Parks	Paul McCulloch and Jimmy Burg (Student)
Nation Rise Wind Farm GP Inc.	John Terry, Grant Worden and Arlen Sternberg

Participant

Karine Walkey Skinner	Self-represented
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Presenters

Cynthia Daoust	Self-represented
Anthony Mekker	Ruby Mekker ⁺
Ruby Mekker	Self-represented
Rainer Pethke	Self-represented
Tenant Acres Ltd.	Cynthia Daoust ⁺
James Winters	Self-represented
Vern Martin	Self-represented

DECISION DELIVERED BY MAUREEN CARTER-WHITNEY

REASONS

Overview

[1] This decision concerns an appeal by the Concerned Citizens of North Stormont (“Appellant”) of Renewable Energy Approval No. 0871-AV3TFM (“REA”) issued to Nation Rise Wind Farm GP Inc. as general partner for and on behalf of Nation Rise Wind Farm Limited Partnership, which is a wholly owned subsidiary of EDP Renewables Canada Ltd. (“Approval Holder”). Following the Hearing of this appeal, the Environmental Review Tribunal (“Tribunal”) concludes that the Appellant has not met the strict legal tests set out in the *Environmental Protection Act* (“EPA”).

Notwithstanding the genuine concerns expressed by the Appellant and the members of the community who participated in the Hearing, the Tribunal dismisses the appeal. The Tribunal's reasons for this decision are set out below.

Background

[2] On May 4, 2018, Mohsen Keyvani, Director, Ministry of the Environment, Conservation and Parks (“MECP” or “Ministry”), issued the REA to the Approval Holder, authorizing the construction, installation, operation, use and retiring of a Class 4 wind facility with a total nameplate capacity of up to 100 megawatts (“MW”), located at various locations in the Township of North Stormont, United Counties of Stormont, Dundas and Glengarry, Ontario (“Project”).

[3] On May 22, 2018, the Appellant filed a Notice of Appeal with the Tribunal, pursuant to s. 142.1 of the *EPA*, seeking revocation of the decision of the Director to issue the REA to the Approval Holder on the grounds that the Project will cause serious harm to human health and serious and irreversible harm to plant life, animal life and the natural environment.

[4] On July 5, 2018, the Tribunal held a Pre-hearing Conference (“PHC”) in Finch, Ontario to address procedural matters for the hearing of the appeal. Following the PHC, the Tribunal issued an Order on July 6, 2018, which granted requests for Participant and Presenter status and set out procedural directions. The Tribunal issued a further Order on July 17, 2018 providing its reasons for the July 6, 2018 Order.

[5] On July 11, 2018, the Tribunal continued the PHC by telephone conference call (“TCC”) to finalize the schedule for the Hearing. During the TCC, counsel for all of the parties agreed to a proposed schedule dated July 10, 2018, subject to several caveats raised by the Appellant, which were addressed subsequently.

[6] The Hearing commenced on July 23, 2018 in Finch and included nine days of evidence, the last day of which was October 16, 2018, and closing oral submissions in Toronto, Ontario on November 23, 2018. The hearing of evidence relating to groundwater was adjourned twice, first on July 31, 2018 and then on August 28, 2018. In its Order issued on August 28, 2018, the Tribunal adjourned the hearing on its own initiative under Ontario Regulation 359/09, *Renewable Energy Approvals under Part V.0.1 of the Act* ("O. Reg. 359/09"), s. 59(2)1.ii, for a period of 44 days, to October 11, 2018. The reasons for these adjournments, as well as a number of other dispositions made by the Tribunal during the course of the Hearing, are set out in Appendix 1.

[7] The Tribunal is required by the *EPA* and O. Reg. 359/09 to dispose of a renewable energy approval appeal hearing within six months of the date of the filing of the notice of appeal. The *EPA* provides in s. 145.2.1(6) that if the Tribunal fails to do so, the decision of the Director to issue the REA is deemed to be confirmed. In this case, because the Tribunal adjourned the proceeding and excluded the 44-day adjournment period from the calculation of the six months in its August 28, 2018 Order in order to secure a fair and just determination of the proceeding on its merits, the statutory deadline for the Tribunal to dispose of this appeal is January 5, 2019.

Issues

[8] The issues to be addressed in these reasons are:

1. whether engaging in the Project in accordance with the REA will cause serious harm to human health, specifically with respect to noise and public safety;
2. whether engaging in the Project in accordance with the REA will cause serious and irreversible harm to plant life, animal life or the natural environment, specifically with respect to birds and bats; and
3. whether engaging in the Project in accordance with the REA will cause serious harm to human health and/or serious and irreversible harm to

plant life, animal life or the natural environment, specifically with respect to groundwater.

Relevant Legislation

[9] The relevant provisions of the *EPA* are as follows:

1. (1) "natural environment" means the air, land and water, or any combination or part thereof, of the Province of Ontario;
3. (1) The purpose of this act is to provide for the protection and conservation of the natural environment.

142.1

- (1) This section applies to a person resident in Ontario who is not entitled under section 139 to require a hearing by the Tribunal in respect of a decision made by the Director under section 47.5.
- (3) A person may require a hearing under subsection (2) only on the grounds that engaging in the renewable energy project in accordance with the renewable energy approval will cause,
 - (a) serious harm to human health; or
 - (b) serious and irreversible harm to plant life, animal life or the natural environment.

145.2.1

- (2) The Tribunal shall review the decision of the Director and shall consider only whether engaging in the renewable energy project in accordance with the renewable energy approval will cause,
 - (a) serious harm to human health; or
 - (b) serious and irreversible harm to plant life, animal life or the natural environment.
- (3) The person who required the hearing has the onus of proving that engaging in the renewable energy project in accordance with the renewable energy approval will cause harm referred to in clause (2) (a) or (b).
- (4) If the Tribunal determines that engaging in the renewable energy project in accordance with the renewable energy approval will cause harm referred to in clause (2) (a) or (b), the Tribunal may,
 - (a) revoke the decision of the Director;
 - (b) by order direct the Director to take such action as the Tribunal considers the Director should take in accordance with this Act and the regulations; or
 - (c) alter the decision of the Director, and, for that purpose, the Tribunal may substitute its opinion for that of the Director.

- (5) The Tribunal shall confirm the decision of the Director if the Tribunal determines that engaging in the renewable energy project in accordance with the renewable energy approval will not cause harm described in clause (2)(a) or (b).
- (6) The decision of the Director shall be deemed to be confirmed by the Tribunal if the Tribunal has not disposed of the hearing in respect of the decision within the period of time prescribed by the regulations.

Issue 1: Whether engaging in the Project in accordance with the REA will cause serious harm to human health, specifically with respect to noise and public safety

Evidence

[10] The Appellant called three fact witnesses to provide evidence in relation to the human health issue: Jane Wilson; Maureen Grady; and Sylvie Renaud. The Appellant also called William Palmer to provide expert opinion evidence. Karine Walkey Skinner, a Participant, testified in support of the Appellant's case, as did the Presenters James Winters, Cynthia Daoust, Ruby Mekker, Rainer Pethke and Vern Martin.

[11] The Approval Holder called Kenneth Little, Development Project Manager for the Project, to provide factual evidence in relation to health and safety issues. The Approval Holder also called the following two expert witnesses to provide opinion evidence: Dr. Robert McCunney and Marc LeBlanc.

[12] The Director did not call any evidence on this issue.

Evidence of the Appellant

Jane Wilson

[13] Ms. Wilson, the volunteer president of Wind Concerns Ontario, stated that she is concerned about the impact of the Project on human health. She noted that the MECP has committed to reviewing complaints, inspecting project sites regularly and ensuring

that projects are in compliance with noise limits. Ms. Wilson testified, however, that she conducted a review of incident reports and concluded that the MECP does not respond to all residents' complaints. Noting that a total of 4,574 incident reports relating to wind energy projects in the Province were filed from 2006 to 2016, she stated that: there was no response from the MECP in greater than 50% of the more than 3,000 complaints over the period of 2006-2014; another 30% of the complaints were marked "deferred response", a term not defined by the MECP; and only 1% of the incident reports received a priority response. Based on her understanding of the notations on the reports, Ms. Wilson also suggested that there was a decline in the response level from the 2006-2014 incident reports to the 2015-2016 reports. She noted that some reports provided insufficient information, which may have contributed to the MECP's failure to respond fully.

[14] Ms. Wilson stated that renewable energy approvals require wind power operators to address complaints about the adverse effects of living in close proximity to wind turbines and that she believes this standard clause expands the scope of the MECP's enforcement responsibilities to include all adverse effects and not just a lack of compliance with the noise guidelines. She said she reviewed the MECP's documents and noted health effects were reported many times among adults and children, including headache, sleep deprivation, annoyance and ringing or pressure sensation in the head and ears. Ms. Wilson also indicated that 39% of reports from 2006 to 2014, and 31% from 2015 to 2016, explicitly mentioned sleep disturbance in the staff notes, and added that sleep disturbance is a well-known contributing factor to illness and a safety risk for people operating heavy equipment such as farm machinery.

[15] Ms. Wilson referred to a MECP staff document, which states that staff observations of the operation of wind turbines had led staff to the conclusion that the operation of the turbines is both tonal and cyclic, and as such should be subject to a 5 decibel ("dB") penalty. She said the staff document further states that guidance in the MECP's October 2008 "Noise Guidelines for Wind Farms" ("Noise Guidelines") indicates

that wind turbines are “not to be treated as tonal or cyclic in nature”; on this basis, she is concerned that MECP management had given staff a directive to not take action.

[16] Ms. Wilson testified that the MECP relies on two documents in response to any comment on serious harm to human health: the 2010 report by Ontario’s Chief Medical Officer of Health entitled “The Potential Health Impact of Wind Turbines” (“2010 CMOH Report”), and Health Canada’s 2014 “Wind Turbine Noise and Health Study” (“Health Canada Study”). She criticized the 2010 CMOH Report as being merely a brief review of existing literature, now outdated by over eight years, but which identified a gap in the data with respect to actual noise measurement in Ontario. Regarding the Health Canada Study, Ms. Wilson noted that it was not designed to determine a causal relationship between wind turbine noise and health but in her view did determine that wind turbine noise causes annoyance, which she described as a medical term denoting stress or distress. The study found that 16.5% of people experienced stress or annoyance at a 550 metre (“m”) to 1 kilometre (“km”) range of distance from turbines, and 25% of people experience stress or annoyance at the 550 m setback distance point.

[17] Ms. Wilson responded to Dr. McCunney’s evidence that infrasound is common in the natural and man-made environment, stating that while that is generally correct, it is incorrect to say that wind turbines do not emit a unique range of noise. She cited the 2015 report entitled “Understanding the Evidence: Wind Turbine Noise” by the Council of Canadian Academies’ Expert Panel on Wind Turbine Noise and Human Health (“Council of Canadian Academies Report”), saying it found wind turbine noise to be a particularly complex and distinctive source of sound, spanning a wide range of frequencies including low-frequency tones.

[18] In response to Dr. McCunney’s evidence, discussed below, that infrasound is not inherently harmful and health risks are related to the intensity of the noise exposure, Ms. Wilson said that the Council of Canadian Academies Report concluded that the evidence is sufficient to establish a causal relationship between exposure to wind

turbine noise and annoyance. She said the Health Canada Study summary concluded that community annoyance is a health indicator and, as wind turbine noise levels increased so did respondents' annoyance to wind turbine associated features such as noise, which Health Canada called a statistically significant finding. Ms. Wilson noted the statements in the Health Canada Study summary that: compared to aircraft, rail or road traffic noise, wind turbine noise annoyance was found to begin at lower sound levels; and wind turbine noise annoyance was found to be related to measured cortisol, systolic and diastolic blood pressure.

Maureen Grady

[19] Ms. Grady stated that she and her family live in close proximity to the Project site, noting that six turbines are proposed within 3 km of her home, two of which would be within 1 km. She related her concern about the risk of the Project causing serious harm to human health and, in particular, about the impact that noise and vibration from the Project may have on pre-existing health conditions, including heart conditions, tinnitus and autism.

[20] Ms. Grady cited two studies in support of her concerns: "Adverse health effects of industrial wind turbines" by Jeffery et al., *Can Fam Physician*, May 2013, 59(5), p. 473-475 ("Jeffery study"); and the Council of Canadian Academies Report. She said these studies concluded that: more research needs to be done; sound is complex and variable; and standard methods for measuring sound will not capture low frequency. Ms. Grady also noted her concern about the relationship between exposure to noise and annoyance and stated that, while the evidence was inadequate to come to any conclusion on a causal relationship regarding cardiac problems, symptoms of annoyance include stress, sleep disturbance, headaches, irritability and anxiety. She noted that even stress on its own is the most reliable trigger of an episode for someone who suffers from a heart condition.

[21] Ms. Grady noted that she has repeatedly informed the MECP and the Approval Holder about her concerns. She added that she has received no response to two letters sent to the Minister of the Environment, Conservation and Parks.

Sylvie Renaud

[22] Ms. Renaud testified that her home is in close proximity to the Project site, 556 m south of a proposed turbine, which would also be 250 m from her rear property line where she walks her dogs on trails daily. She noted that her primary concerns are about the health impacts of noise emissions and safety risks due to ice throw and debris from turbine blade failure.

[23] Ms. Renaud stated that she has developed chronic tinnitus as a result of treatment for earlier health issues. Ms. Renaud testified that she experiences a ringing in her ears that is worsened by repetitive noise, and noted that when she visited the Approval Holder's South Branch Wind Project with 10 turbines, she quickly developed a migraine and the buzzing in her ears became louder and constant.

[24] Ms. Renaud testified that she provided specific information about her health concerns to the Approval Holder at its public meetings and in an email to Nick Colella of the MECP on January 8, 2018. She further testified that after discussing the concern with Mr. Little, the Approval Holder's representative, she initially received no response but eventually was told that health concerns were not a criterion in deciding where to locate the turbines.

William Palmer

[25] Mr. Palmer, a retired engineer, was qualified to provide opinion evidence as a professional engineer with expertise in public safety risks due to turbine failure (see Appendix 1 for the Tribunal's reasons for qualifying him in this manner). He noted that O. Reg. 359/09 requires a setback distance of the hub height of a turbine from the

property of any person with whom the owner has not entered into an agreement and, for the Project, this would result in a setback of 132 m from any property boundary where no Property Setback Assessment (“PSA”) is prepared. Mr. Palmer added that O. Reg. 359/09 provides for a reduced setback distance if a PSA is submitted showing that the proposed location of the turbine will not result in adverse impacts on any nearby businesses, infrastructure, properties or land use activities, and describing preventative measures to be implemented. He stated that the PSA completed for the Project allows for a reduced setback distance of the blade length plus 10 m, resulting in a setback of 81 m.

[26] Mr. Palmer testified concerning his analysis of the nine wind turbine failures that have occurred in Ontario since 2007, where pieces of turbine debris were found at distances greater than the prescribed setback distance. Regarding the Vestas V80 turbine blade failure on May 4, 2018 at the Huron Wind Farm in Bruce County, Ontario, for which the permitted setback distance would be 80 m without a PSA, or 51 m with a PSA, he stated that blade pieces were found up to 560 m away from the turbine, which could have injured an individual or livestock, and that pieces as large as 1.2 m by 3 m travelled 280 m from the turbine. Mr. Palmer calculated that, in Ontario, the turbine failure rate (including blade failure, fire and tower collapse) is about nine failures in 12,500 turbine years, and suggested that the Project could expect one failure over a 25-year operating window. However, he acknowledged under cross-examination that there have been no incidents in Ontario where a person has been injured by debris from a wind turbine.

[27] In response to Mr. LeBlanc’s critique of his analysis and calculations (discussed below), Mr. Palmer further explained the statistical analysis he used to determine the rate of turbine failure. He stated that his analysis was carried out in the same manner that other Ontario power generating facilities use to calculate public safety risk and showed that the Ontario turbine failure rate is statistically significant. In response to Mr. LeBlanc’s assertion that Vestas and Enercon turbines have low failure rates,

Mr. Palmer noted that publicly available databases identify many Vestas and Enercon turbine failures in the past 10 years.

[28] Mr. Palmer testified that risk assessment includes two evaluation techniques, one deterministic and the other probabilistic. He said that the deterministic risk assessment asks whether a blade failure can occur and whether the failure could throw debris to a distance that could cause harm. Noting that Ontario experience shows that turbine failures have put pieces of debris large enough to cause serious harm at a distance beyond the prescribed setback distances, Mr. Palmer stated that such an accident fails the deterministic test. He stated that the probabilistic risk assessment deals with a population basis of injury, considering where people live, how close they are to the turbine location, wind direction, speed and other factors. He added that it is not acceptable to conduct a probabilistic assessment in the absence of a deterministic assessment. It was Mr. Palmer's conclusion that the Project's setback distances are not sufficient to prevent harm to human health from debris. He suggested that similar arguments could be made regarding the projection of ice pieces from a turbine.

Evidence of Presenters and Participant

Karine Walkey Skinner

[29] Ms. Walkey Skinner stated that her family home, owned by her son, is located 800 m from turbine T4 and within 1 km of T7. She said that, while she currently resides in Texas, she intends to move back to her home in the future; at this time, the house is being rented to a family with a newborn baby. She is concerned that the Project will cause serious harm to her tenants' health and eventually to herself and her husband when they return.

[30] Ms. Walkey Skinner testified that she has concerns about the impact of noise emissions from the turbines on mental health, noting that an individual with a pre-existing mental health condition is more vulnerable than a person not suffering from such a condition.

[31] Ms. Walkey Skinner also stated that she is worried that noise from the Project will have negative impacts on sleep and undermine coping and functioning abilities, noting that adequate sleep is critical to people with mental health issues and is recognized as a beneficial coping mechanism. She said that her husband informed her that he has heard wind turbines from a mile away in Texas.

James Winters

[32] Mr. Winters testified that he, his wife and two sons own a dairy farm in close proximity to the Project and, in particular, proposed turbine T56; one son and his family live approximately 700 m from this turbine and the other son and his family live approximately 900 m away from it. He noted that he has four grandchildren under the age of five in his sons' families, with two more on the way. Mr. Winters said he is concerned about the impact of low- and high-frequency noise emissions on human health, and on children in particular. He stated that audible noise from the Project is very likely to be above 40 A-weighted decibels ("dBA") at times because the proponent chose to use the Noise Guidelines from 2008 instead of 2013, and further stated that the 2008 Noise Guidelines underestimate the amount of noise that people can be expected to experience. Mr. Winters testified that while low-frequency noise has not been addressed, he is aware of its existence and potential to cause serious harm to human health. He discussed his concern that constant exposure to noise emissions could have an adverse impact on hearing and sleep quality, especially for young children.

[33] Mr. Winters also expressed concern about the risk of ice throw in the winter and debris from blade failure as the turbines deteriorate. He testified that this is a concern for workers in the field during both the summer and winter agricultural seasons, because part of his property is less than 250 m from the proposed turbine. Mr. Winters stated that the Approval Holder had produced no information on the dangers associated with possible debris from turbines.

Cynthia Daoust

[34] Ms. Daoust, who lives in the vicinity of the Project (but did not specify how close her home is), addressed her concern that sound from the wind turbines has the potential to have an impact on a pre-existing condition of overly sensitive hearing and difficulty filtering sound.

Ruby Mekker

[35] Ms. Mekker testified that she has lived in the North Stormont area for 43 years and used to own a dairy farm in the region, which is now owned and operated by her son, Anthony Mekker. She raised a number of concerns about the Project relating to the human health issues that may result from noise emissions. With respect to noise emissions, Ms. Mekker stated that many doctors around the world have recognized serious health issues caused by infrasound and low-frequency noise from wind turbines. She referred to an October 2016 letter sent by Dr. Elizabeth Bowen, President of Physicians for Social Responsibility to the World Health Organization (“WHO”) with over 100 signatories, including 12 from Canada, which recognized the WHO’s efforts to update its noise guidelines and stated that mitigation against adverse health effects following the construction of wind turbines had been absent from planning guidelines and noise pollution regulations in many European countries. Ms. Mekker said that the letter encouraged the WHO to review the evidence to assess likely effects, such as sleep disturbance, annoyance, cognitive impairment, mental health and well-being, cardiovascular diseases, hearing impairment, tinnitus and adverse birth outcomes.

[36] Ms. Mekker raised a question about the appropriate setback distances to minimize the impact of noise emissions. She stated that Ontario continues to use 550 m setbacks regardless of turbine size and sound power levels, noting that, since 2013, Quebec has required setbacks of 2,000 m from homes and 1,000 m from roads. Ms. Mekker said she is aware of the MECP's failure to investigate thousands of noise complaints about industrial wind turbines despite its mandate to do so.

[37] Ms. Mekker also provided evidence on behalf of her son, who with his wife owns and operates a dairy farm in the vicinity of the Project, where they live with their two young sons. Ms. Mekker stated that Mr. Mekker is concerned about the impact of the Project on human health and notes that, in other parts of rural Ontario, there are documented negative impacts of industrial wind turbines. She said that Mr. Mekker objects to the fact that the Project was given the option of following less stringent noise guidelines even though the MECP is aware of the dangers of higher noise levels and has required subsequent projects to abide by lower, safer noise guidelines. Ms. Mekker also stated that Mr. Mekker is concerned about the impact on a pre-existing condition of perforated eardrums that could result from exposure to noise emissions.

Rainer Pethke

[38] Mr. Pethke testified that he lives 571 m from proposed turbine T28, and noted that the maximum calculated sound pressure level at his home would be 38.4 dBA. He stated that this assessment used the out-dated 2008 Noise Guidelines and calculated that, if this figure had been calculated using the current Noise Guidelines, it would be 40.4 dBA. He said that decibels are logarithmic, meaning that a 3 dB increase represents a doubling of sound intensity or acoustic power. Mr. Pethke criticized the public information provided by the Approval Holder on turbine specifications, stating that the Approval Holder did not provide a guarantee letter by a qualified technical expert to back up its statement about the typical tonal audibility of the Vestas turbine model. He also noted gaps in the wind turbine specifications checklist required by the REA.

[39] Mr. Pethke is concerned about the impact of the Project on a person with the pre-existing condition of multiple sclerosis (“MS”) and particularly on an individual who has no choice but to remain in the house at all times. He emphasized the prevalence of MS in Canada, stating that 1 in every 385 Canadians suffers from this disease, and stated that this vulnerable cohort was not considered by the proponent or the government. Mr. Pethke noted that noise has an audible component, as well as an inaudible component described as infrasound, and stated that industrial wind turbines produce both types of noise and these can potentially impact human health, particularly for those individuals with a debilitating disease such as MS. Mr. Pethke also stated that a feature of MS is noise sensitivity, known as hyperacusis, the symptoms of which include ear pain, annoyance and general intolerance to many sounds that do not affect most people. He said that another related condition is misophonia, which causes feelings of panic, rage and anxiety in response to certain triggering sounds.

[40] Mr. Pethke testified that the combined effect of directional sound and vibrations from the towers, the phase between turbine blades, lensing in the air or ground, and interference between turbine noises, would create localised zones of “heightened noise”, leading to turbine noises appearing and disappearing in the span of a few metres. He noted that an individual with MS may not be capable of moving out of a heightened noise zone. Mr. Pethke stated that the Health Canada Study is often cited to counter claims of negative health effects but does not measure C-weighted low frequency noise, and does not consider special groups with noise sensitivity and severely restricted mobility. He added that the Health Canada Study does not evaluate the impact of noise emissions on people who moved away from their homes after a wind project was introduced nearby.

[41] To explain his concerns, Mr. Pethke provided further detail about infrasound and cited numerous studies that indicated the following: harm to health by exposure to low-frequency noise from a wind turbine operation; the presence of infrasound from a separate wind turbine facility located 26 km away, and possible amplification of wind

turbine infrasound by residential buildings; and a potential health risk for people with migraine or other types of central sensitization from infrasound from wind turbine operations. He stated that the Approval Holder did not measure infrasound and infrasound was not included in the REA, adding that low-frequency noise and infrasound cannot be accurately measured by dBA. Mr. Pethke noted that it would not be feasible to build a barrier around his home of the height and thickness required to block infrasound.

[42] With respect to ice throw and debris from blade failure, Mr. Pethke indicated his concern that the Project's property setbacks were inadequate, noting that proposed turbine T28 would be located 87.3 m from the boundary of his property. He calculated that the blade tips would be 19.3 m from his property boundary and emphasized that his equestrian operation spans his entire property, the horses stay out year round, and equestrian activities involving humans continue to take place during the winter months. Noting that the Approval Holder's PSA says that there will be "no adverse impact" on his property, Mr. Pethke stated that the degree of risk is higher than the proponent speculates and that he was not consulted or asked for input on the potential for impacts on his property. He noted a lack of responsiveness in his contact with Mr. Little, the Approval Holder's Project Manager, in his attempts to correct the PSA and advise that his equestrian operation spanned the entire property.

[43] Mr. Pethke testified that the Approval Holder did not complete any ice studies and did not include ice detection or mitigation options in the turbine specifications study, noting that debris from blade failure is also a risk and could occur at any time of year, not just in the winter. He cited a 2018 study by Caithness Windfarm Information Forum indicating that as more wind farms are built, the number of accidents per year is growing and that the current number of accidents is approximately 180 per year, including ice throw, structural failure and collapse, fire, debris fling and blade failure. Mr. Pethke listed accidents that have occurred in Ontario, noting that these events were significant enough to have injured or killed a person or animal, had there been any located at the point of impact. He stated that the Approval Holder's Ice Throw Report for the South

Branch Wind Farm, which uses smaller turbines than proposed for the Project, said that ice fragments did not travel beyond 350 m. Mr. Pethke noted that the turbines for the Project will be much taller and that ice throw could be expected to travel well past the 19.3 m setback from the blade tips to his property boundary. He further noted that the Approval Holder's Emergency Response Plan ("ERP") would not be adequate, stating that it is more focused on maintaining continuity of operations and limiting energy losses than on protecting the local community.

Vern Martin

[44] Mr. Martin, Senior Mechanical Engineer at FLOWCARE Engineering Inc., was qualified to provide opinion evidence as an engineer with expertise in large industrial fans (see Appendix 1 for the Tribunal's reasons for qualifying him in this manner). He testified that large fan applications have a strong similarity to wind turbines with respect to various design, manufacturing, installation, operation and maintenance aspects. Mr. Martin stated that the causes of failures of industrial fans include: faulty designs; poor manufacturing quality; inappropriate installation methods; poor maintenance; lack of inspections; and inappropriate operations. He noted that failure mechanisms relate to basic mechanical engineering principles and can occur on all types of rotating machinery. He also noted that fatigue is a failure mechanism in "cyclical" machines, stating that, as rotating machinery continues to cycle, small crevices open up over time as the material becomes stressed, which are hard to detect through inspections.

[45] Mr. Martin stated that industrial wind turbines can and will catastrophically fail, and that failures have occurred in Ontario. He further stated that the impact of industrial wind turbine equipment failure is unique because the field of debris extends well beyond the immediate location of the turbine, in part because of the centrifugal force involved with rotating machinery. Mr. Martin said that catastrophic failure in wind turbines will result in large pieces of debris, and could result in serious damage, injury or death. In his view, the separation distances for wind facilities set out in s. 53(1) of O. Reg. 359/09 are inadequate.

[46] Mr. Martin emphasized the need for preventative measures to ensure that the scope of damage resulting from failure is limited to a location where debris cannot cause damage, physical harm or death. He provided examples of acceptable preventative measures, including: adequate separation distances; signage indicating the risk to property, individuals and animals within the range of a worst case debris field; and installation of fire suppression equipment.

Evidence of the Approval Holder

Kenneth Little

[47] Mr. Little explained that, as the Development Project Manager for the Approval Holder, he is responsible for the development stages of the Project and for overseeing the preparation and application for the REA for the Project. He described the Project and its location, a region composed of mainly agricultural land used for corn, hay and soybeans. Mr. Little stated that the main components of the Project are: up to 33 wind turbine generators; their foundations, crane pads, and laydown areas; and associated ancillary equipment, systems and technology, including a transformer substation, on-site access roads, and underground and overhead cabling and distribution lines. He said that the two types of foundations that will be used are spread footing foundations (22 turbine locations) and deep foundations (11 turbine locations). Mr. Little noted that spread footing foundations use a poured concrete base, while deep foundations use case, steel, concrete or grout piles, installed by drilling or auguring, to further support a spread footing foundation. He testified that no H-piles (which he described as deep foundations installed through drilling, boring or auguring) or pile driving will be employed, no turbines will be located within 200 m of an active drinking water well and no deep foundations will be located within 500 m of an active drinking water well. He further testified that all Project components will be installed on privately-owned agricultural lots, with the exception of the electrical collector lines that are partially-sited within public road allowances to connect to the substation.

[48] Mr. Little stated that the Vestas V136 Serrated Trailing Edge (STE) turbine model was selected as the “reference wind turbine” and the Enercon E-138 was selected as the potential alternative acoustically-equivalent turbine. He described the wind turbines as technologically sophisticated, computerized machines that are monitored remotely on a continuous basis and in person on a periodic basis, and stated that the Approval Holder will employ proactive and preventative blade monitoring for the Project. Mr. Little said this includes a combination of continuous automated monitoring and visual inspections, for example, after any event that could potentially cause damage to the blades such as high wind, potential icing events and lightning strikes. He noted that this allows the Approval Holder to detect abnormalities before any failure occurs. Regarding ice mitigation, Mr. Little stated that the reference turbines are designed to protect against potential damage resulting from ice build-up by shutting down automatically when their sensors detect ice formation, and that the Approval Holder has significant experience in ice mitigation because a substantial portion of their wind projects are in regions subject to climatic icing events. He said that, further to its operating protocols to minimize risks and manage icing, the Approval Holder will visually inspect the relevant turbines before restarting them after an icing event to ensure that the ice condition no longer exists. He added that the Approval Holder will use meteorological data to predict weather conditions at the site on a daily basis and, if the forecast calls for high humidity and below-freezing temperatures, the Approval Holder’s operators will monitor sensors to ensure no ice build-up is occurring.

[49] Addressing Mr. Pethke’s concern that the sound pressure level determined for his property was calculated using the out-dated MECP 2008 Noise Guidelines, Mr. Little testified that the Approval Holder used the Noise Guidelines that were in effect at the relevant time. He said the Noise Guidelines focus on the worst case scenario inputs to ensure that the sound level the receptor would ultimately experience would be less than the levels predicted by the modelling. In response to Mr. Pethke’s assertion that the Approval Holder did not provide all of the required information in the Wind Turbine Specification Checklist, Mr. Little stated that those concerns were addressed in a

submission to the MECP and that all of the required information has been provided, except for information that Condition A9 of the REA requires to be provided three months prior to the first turbine delivery.

[50] Regarding Mr. Pethke's concern that the Approval Holder did not adequately consider the land use at his property, Mr. Little stated that this was determined through desktop investigations using publicly available and privately purchased aerial imagery, site investigations on leased properties and investigations during visual receptor confirmations to support the Noise Impact Assessment. He said the Approval Holder was advised of the equestrian operation at Mr. Pethke's property during the June 27, 2017 public consultation meeting, and this designation was added to the final version of the PSA filed with the MECP. He noted that, although the measurements for the PSA are initially determined from the best available satellite data, they must be confirmed with professional surveys prior to project construction, and the REA requires compliance with all setbacks established under O. Reg. 359/09.

[51] Mr. Little provided further information in response to Mr. Pethke's concern about the adequacy of the ERP. He said each turbine is individually controlled through local operations and maintenance, and a remote operations control centre ("ROCC") operating 24 hours per day, seven days per week. Mr. Little testified concerning the procedure as follows:

- during fault shutdowns, the turbine is controlled by the local operator, who sends an automatic alarm/notification to the ROCC, lead technicians and the plant operations manager; the plant manager or lead technician is the local operator and first responder to any turbine shutdowns during normal business hours, and reads the error code to determine if the turbine can be restarted remotely or if an emergency is indicated;
- on weekends and evenings, the ROCC performs the same procedures as the day crew during normal business hours and calls the designated individual to the site; in the event of an emergency situation during

operation, either on-site or ROCC staff initiates the shutdown of the affected Project components through the Supervisory Control and Data Acquisition (“SCADA”) system;

- if a fire is observed or detected, the Approval Holder’s staff immediately call 911 to dispatch the local fire department and shut down the turbines if necessary; prior to commencing operations, local first responders meet with on-site personnel for a site orientation, review of emergency procedures and confirmation of communication protocols; and
- the Approval Holder’s Predictive Diagnostics team monitors and prioritizes condition-specific alarms, while the Performance Analytics team will monitor and analyze performance trends, and if any information suggests conditions that could precipitate failure, these teams can mitigate risk through a variety of measures including adjusting the angle of the blades or initiating the shutdown of the Project.

Dr. Robert McCunney

[52] Dr. McCunney, a medical doctor and research scientist at the Massachusetts Institute of Technology (“MIT”), was qualified to provide opinion evidence as a medical doctor specializing in occupational and environmental medicine with particular expertise in health implications of noise exposure. He reviewed and provided his expert opinion on the concerns raised in the witness statements and presentations of Ms. Grady, Ms. Renaud, Ms. Wilson, Ms. Mekker, Ms. Walkey Skinner, Mr. Winters and Mr. Pethke.

[53] Regarding Ms. Grady’s and Ms. Renaud’s concerns about the potential impact of the Project on individuals with pre-existing health conditions such as heart issues, tinnitus and autism, Dr. McCunney said he was not aware of any scientific studies or medical literature that suggests an impact on tinnitus, heart issues or autism due to noise levels associated with the operation of wind turbines or shadow flicker. He also said he was unaware of any publication suggesting a link between noise produced by

wind turbines and the exacerbation of any of the symptoms that accompany those pre-existing conditions.

[54] Regarding Ms. Wilson's concerns about the potential for the Project to cause annoyance, and her statement that annoyance is an adverse health effect, Dr. McCunney testified that annoyance associated with wind turbines is a subjective phenomenon that seems to be primarily related to attitudes about the visual impact and economic benefits associated with wind turbines, and that, in his opinion, it is not a health effect. In support of his opinion, he cited a number of studies and stated that he was unable to find annoyance described in any medical dictionary and did not locate it as a disease entity in the 10th revision of the International Classification of Diseases ("ICD-10"). Dr. McCunney further stated that the WHO 1948 constitution and subsequent publications do not indicate that the WHO considers "annoyance" an adverse health effect and concluded that claims that annoyance is an adverse health effect reflect individual opinion and are not the consensus of the international medical community.

[55] Dr. McCunney also addressed the Health Canada Study cited by Ms. Wilson, calling it the largest epidemiological study evaluating whether people living in proximity to wind turbines experience more or unique effects compared to the rest of the population. He stated that Health Canada researchers subjected the proposal to a rigorous peer review process in designing the study before conducting the research, but also noted that the study has several limitations. Dr. McCunney stated that the results of the study may not be generalized to areas beyond the sample because the samples were not randomly selected from all possible sites operating in Canada and do not permit conclusions about causality. He noted that, despite these limitations, the study found that wind turbine noise is not associated with self-reported sleep disturbance or disorders, self-reported illnesses and chronic health conditions, or self-reported perceived stress and quality of life. He also said it found no association between wind turbine noise and objectively measured results such as blood pressure, resting heart rate, sleep efficiency and rate of awakenings.

[56] Dr. McCunney testified that the conclusions of the 2010 CMOH Report were consistent with the Health Canada Study, and also consistent with what Dr. McCunney and his co-authors observed in two other studies published in 2009 and 2014: "Wind Turbine Sound and Health Effects: An Expert Panel Review" by Colby et al, December 2009, prepared for the American Wind Energy Association ("AWEA") and the Canadian Wind Energy Association ("CanWEA") ("2009 literature survey"); and "Wind Turbines and Health: A Critical Review of the Scientific Literature" by McCunney et al, *Journal Occup Environ Med*, November 2014, 56(11), p. e108-30 ("2014 literature survey"). He noted that the 2010 CMOH Report concludes that "while some people living near wind turbines report symptoms such as dizziness, headaches and sleep disturbance, the scientific literature available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects."

[57] Dr. McCunney addressed Ms. Mekker's concerns about infrasound and low frequency noise, and the impact of the Project in relation to: sleep disturbance; annoyance; cognitive impairment; mental health and well-being; cardiovascular diseases; hearing impairment; tinnitus; and adverse birth outcomes. He testified that there are no scientific studies that demonstrate adverse health effects from infrasound or low-frequency sound at the levels encountered near homes in the vicinity of wind turbines. Dr. McCunney further testified that there is no association between exposure to outdoor wind turbine noise and an increase in the prevalence of disturbed sleep. He said he is not aware of any scientific studies or medical literature suggesting that noise levels associated with the operation of wind turbines cause any of the general health concerns raised by Ms. Mekker.

[58] With respect to Ms. Walkey Skinner's concerns, Dr. McCunney testified that he is not aware of any scientific studies or medical literature that suggests an impact on people with pre-existing mental health issues due to the operation of wind turbines. Regarding Mr. Winters' concerns about the potential impact of low- and high-frequency noise on adults and children, Dr. McCunney stated that no scientific studies

demonstrate adverse health effects from infrasound, low-frequency sound or high-frequency sound in adults or children at the levels encountered near homes in the vicinity of wind turbines.

[59] Dr. McCunney addressed Mr. Pethke's concerns about infrasound, low-frequency sound and the potential impact of the Project on people who suffer from MS. Dr. McCunney said that infrasound is typically defined as frequencies between 0 to 20 Hertz ("Hz") and is not unique to wind turbine operations, noting that common examples of man-made or natural phenomena that produce infrasound include sea waves, heartbeats, lung sounds and refrigerator compressors. He stated that infrasound is not inherently harmful, depending on the intensity of the noise exposure. Dr. McCunney testified that he has found no evidence that audible or sub-audible sounds emitted by wind turbines, including infrasound, have any direct adverse physiological effect. Dr. McCunney concluded that there is no evidence to suggest that noise from wind turbines, including infrasound and low-frequency noise, will aggravate MS or cause it to progress and further that there is no evidence that symptoms of MS, such as hyperacusis, misophonia and maintaining balance, will be exacerbated.

[60] On cross-examination, Dr. McCunney was asked to comment on subsequent statements made by two of his co-authors of the 2009 literature survey, Dr. David Colby and Dr. Geoff Leventhall, about stress effects and annoyance from low levels of noise. He responded that he did not infer from these statements that Dr. Colby and Dr. Leventhall recognized annoyance as a medical issue, and further noted that these statements were made nine years earlier and that he did not know whether the statements reflect their current opinions.

Marc LeBlanc

[61] Mr. LeBlanc, a senior project manager at the DNV GL consulting firm, was qualified to provide opinion evidence as an engineer with expertise in risk and public safety assessment in the context of the development, construction and operation of

wind farms (see Appendix 1 for the Tribunal's reasons for qualifying him in this manner). He noted that the Vestas V136 Serrated Trailing Edge is the Project's reference wind turbine, and the Enercon E-138 is an acoustically equivalent turbine ("Project Turbines"). Mr. LeBlanc said the Vestas is a very reliable turbine with a common blade structure and very low failure rate, and stated that DNV GL is unaware of any structural failure of a V136 blade worldwide. He further stated that the Vestas turbine that failed, referred to by Mr. Palmer, is a much older model and neither representative nor predictive of potential blade failure events. Regarding the Enercon E-138, Mr. LeBlanc said it is a new turbine model designed and manufactured by a reputable and well-known turbine manufacturer. He testified concerning the rigorous design and certification process to which wind turbines are subjected, stating that the Project Turbines specifically have blades that: pitch to remove aerodynamic driving torque; provide a breaking torque in its place; and are equipped with a high wind operation mode that recognizes high winds and controls the turbine to reduce the risk of damage by pitching the blades out of the wind. It was Mr. LeBlanc's opinion that the Project will not pose any significant risk of blade failure or ice throw.

[62] Mr. LeBlanc referred to the 2005 Dutch Handbook, an industry standard reference, to support his opinion evidence that the risk of blade failure is 1 in 1,600 (0.0006) turbines per year. He noted that the authors of the Dutch Handbook found that the overall blade failure rate has declined by a factor of 3 since the early 1990s and projected that the rate would continue to decrease. Mr. LeBlanc indicated that the 2014 edition of the Dutch Handbook maintains a similar modelling rate and notes a continued downward trend over the last 10 years, with the five-year rolling average decreasing to slightly over 0.0002 turbines per year. He attributed this downward trend to improvements in technology that have resulted in a decrease in both the incidence of blade failure and the severity of failure in the rare cases in which it occurs. Mr. LeBlanc noted that the Approval Holder intends to employ a proactive and preventative blade inspection practice, and that turbine locations were placed within appropriate setback distances. For these reasons, it was his opinion that the risk of harm from blade failure at the Project is very low.

[63] It is Mr. LeBlanc's opinion that Mr. Palmer's calculation of risk for the Project is statistically flawed and should not be used as the basis to predict future failures. Regarding Mr. Palmer's evidence, Mr. LeBlanc testified that: Mr. Palmer's wind turbine sample size is too small and using a larger sample size would reduce the failure rate; the number of failure events is too small to produce a meaningful analysis, given that a statistic derived from such a small dataset is prone to error; and a number of the incidents identified by Mr. Palmer involved older blade technology that is not representative of the Project Turbines. Mr. LeBlanc further stated that the incidence of blade failure is not the same as incidence of detachment and injury, noting that the probability of the blade failing, detaching, following a specific trajectory and hitting a person is extremely remote. Referring to a 2007 report by GL Garrad Hassan, he said he was not aware of any incident of injury caused by blade failure.

[64] Mr. LeBlanc also critiqued Mr. Palmer's focus on the deterministic approach to evaluating public safety risk as unrepresentative of a real world scenario. He stated that the deterministic evaluation only considers the possibility of a blade failure event occurring at the Project, to the exclusion of considering the likelihood of that event causing a risk to the public.

[65] Regarding ice throw, Mr. LeBlanc testified that the Project Turbines are designed to operate in cold weather and programmed to shut down automatically when their sensors detect rotor imbalance due to ice formation, resulting in a very low chance of ice throw. He further noted that the Approval Holder has mitigated the risk of ice fall by respecting setback distances, using meteorological data to predict weather conditions on a daily basis, monitoring sensors for ice build-up and implementing a communication plan to inform local land owners of potential icing events. It was Mr. LeBlanc's opinion that the overall risk of harm due to ice throw is very low.

[66] Mr. LeBlanc was of the view that Mr. Martin's experience with equipment failure in the context of industrial fan applications is neither representative nor predictive of the risk of wind turbine equipment failures. Mr. LeBlanc provided the following reasons to support his opinion: wind turbines are highly sophisticated, computerized machines whose value depends on their proper design, maintenance, installation and operation, and manufacturers and operators are highly incentivized to put systems and protocols in place to prevent equipment failure and mitigate impacts; industrial fans and wind turbines operate differently and serve completely different functions (for example, wind turbines generate energy by driving blades at low speeds, while industrial fans use energy to move blades at very high speeds); wind turbines are subject to extensive and routine scheduled maintenance, usually every six months, and are equipped with a SCADA system to relay critical information to operators on a constant basis; and each turbine is individually controlled at two levels, the local operations and maintenance building as well as the ROCC.

[67] Regarding Mr. Martin's concern about the Project's setback distances, Mr. LeBlanc testified that the Project has met all provincial setback standards, and reiterated that the risk of debris from blade failure and ice throw are very low. Mr. LeBlanc also responded to Mr. Martin's suggestion that fire suppression equipment should be installed as a preventative measure. Mr. LeBlanc stated that fires are extremely rare for modern turbines because they meet or exceed electrical safety standards, and have lightning arc detection and a lightening protection system. He further stated that, based on the rare instances in which fires have occurred: the fire would occur in the nacelle; small debris would likely be extinguished before touching the ground; and any larger debris would likely fall directly below the turbine, very close to the tower. Mr. LeBlanc noted that the Approval Holder has instructed its staff to immediately call 911 in case of fire, and will meet with local first responders and on-site personnel to review emergency procedures. It was Mr. LeBlanc's opinion that the risk of fire at the Project Turbines is very low.

[68] Regarding the concerns raised by Mr. Pethke, Mr. LeBlanc was of the opinion that the overall risk of harm to people on Mr. Pethke's property, resulting from blade failure or ice throw, is very low. Further, Mr. LeBlanc stated that the manufacture, maintenance and monitoring procedures in the ERP will effectively mitigate the risk of an emergency occurring at the Project.

Discussion, Analysis and Findings on Issue 1

Submissions

Appellant's Submissions

[69] The Appellant's submissions are based on a review of the evidence provided at the hearing, and it divides the submissions on serious harm to human health into two broad categories: harm to health, in relation to impacts of noise on pre-existing health conditions, developing legislation on wind turbine noise emissions, failure of protective processes, and government acknowledgement of adverse health impacts; and risks to safety, in relation to debris and ice throw.

[70] In its submissions concerning pre-existing health conditions, the Appellant reviews and relies on the evidence of Mr. Pethke, Mr. Winters, Ms. Daoust, Ms. Walkey Skinner, Ms. Renaud and Ms. Grady, and addresses the opposing evidence of Dr. McCunney.

[71] The Appellant summarizes Mr. Pethke's concerns regarding MS and hypersensitivity to noise and selective sound sensitivity. Referring to specific papers Mr. Pethke cited, the Appellant also reviews his concerns about exposure to infrasound and about increased levels of low-frequency noise from larger turbines. In particular, the Appellant refers to the following statements from papers cited by Mr. Pethke: as wind turbines get larger, worries have emerged that turbine noise would move down in frequency and low-frequency noise would cause annoyance for neighbours; regarding

measurement of infrasound from wind turbines, data delineates the blade passage frequency and up to five or more harmonics; data appears to indicate the presence of infrasound from a wind turbine facility 26 km distant; and data appears to indicate that it is possible for residential buildings to amplify wind turbine infrasound. Based on Mr. Pethke's reference to a Health Canada webpage, the Appellant submits that the most common effect of community noise is "annoyance", which is considered to be an adverse health effect by the WHO.

[72] With respect to Mr. Winters' evidence, the Appellant refers to Dr. McCunney's statement that, based on the results of the Health Canada Study, there is no evidence to suggest that children or others would be negatively impacted by wind turbine noise, if Ontario's minimum 550 m setback and the conditions of the REA were followed. The Appellant submits Dr. McCunney's assertion is incorrect because one of the preliminary research findings in the Health Canada Study was that results may not be generalized to areas beyond the sample area, as the wind turbine locations in that study were not randomly selected from all sites operating in Canada. The Appellant further submits that the study population in the Health Canada Study consisted of one person, between the ages of 18 and 79 years, from each household randomly selected to participate in the vicinity of wind turbine installations in Ontario and PEI; no children under 18 or adults over 79 years of age were included in the study. The Appellant asserts that generalized comments regarding the Health Canada Study and conclusions that everyone, including children, would not be affected by wind turbine noise are misleading and incorrect.

[73] The Appellant notes Ms. Daoust's concerns about the potential for the Project to create mental health issues due to the stress and noise from the introduction of wind turbines. The Appellant further notes the additional stress created for Ms. Daoust and her family when they experienced sediment and discolouration in their well water shortly after the Approval Holder conducted test borehole drilling near their residence.

[74] The Appellant refers to Ms. Walkey Skinner's evidence about her concerns that noise from the turbines near her family home will negatively affect human health and, in particular, mental health. The Appellant submits that, while the MECP urges the industry to take a good neighbour approach when sensitive human or ecological receptors are in the area, the Approval Holder has not made any changes to the Project's setback, location or operational practices even when informed of concerns about hypersensitivity to repetitive noise. The Appellant submits that Dr. McCunney did not address the impact of repetitive noise on people suffering from tinnitus and an increased sensitivity to repetitive noise.

[75] Referring to Ms. Grady's concerns about pre-existing conditions and the studies she referred to in her evidence, the Appellant notes Dr. McCunney's testimony that there is no evidence to suggest that noise from wind turbines have an adverse effect on these conditions. The Appellant submits that Dr. McCunney offered no comment on the Jeffery study, noting that it referenced a 2010 report commissioned by the MECP, entitled: "Low frequency noise and infrasound associated with wind turbine generator systems: a literature review", December 10, 2010, by Howe Gastmeier Chapnik Limited ("Howe report"). The Appellant asserts that the Howe report stated that audible sound from wind turbines, at the levels experienced at typical receptor distances in Ontario, is expected to result in a non-trivial percentage of persons being highly annoyed, and that research has shown that annoyance associated with sound from wind turbines can be expected to contribute to stress related health impacts in some persons.

[76] With respect to developing legislation on wind turbine noise emissions, the Appellant refers to the evidence of Ms. Mekker and her evidence on behalf of her son, Mr. Mekker, as well as the evidence of Dr. McCunney. The Appellant notes Ms. Mekker's evidence that the WHO is developing environmental noise guidelines for the European region based on a review of recent significant research on a range of health effects of environmental noise from sources that include wind turbines. The Appellant also refers to Ms. Mekker's evidence concerning the open letter to the WHO, which states that mitigation against adverse health effects is required. The Appellant notes

Dr. McCunney's response to Ms. Mekker's evidence, in which he stated that there is no evidence to suggest that noise from wind turbines will have adverse health effects and cited the 2009 and 2014 literature surveys that he co-authored. The Appellant submits that these literature surveys were prepared for and funded by two wind power industry trade associations: AWEA and CanWEA.

[77] Regarding Dr. McCunney's evidence characterizing the annoyance associated with wind turbines as a subjective phenomenon, related primarily to attitudes to the visual impact of wind turbines and economic benefit associated with wind farms, the Appellant submits that the Council of Canadian Academies Report commented on visual and noise effects from turbines. According to the Appellant, that Report states that these effects are difficult to isolate from each other and the current state of the evidence does not allow for a definite conclusion about whether annoyance is caused by exposure to wind turbine noise alone, or whether factors such as visual impacts and personal attitudes modify the noise-annoyance relation and to what extent, because the studies completed to date do not measure these factors independently of each other.

[78] The Appellant asserts that the Council of Canadian Academies Report noted that the audible link to annoyance from wind turbines is hard to separate from the visual link since the current turbine models are at least 200 m high, their moving blades cast shadow flicker at nearby homes at certain times of the day and the year, and they include a flashing red light on the nacelle in order to be visible during the night as well as daytime. The Appellant states that because there are both audible and visual stressors, annoyance may be accentuated. The Appellant further asserts that Dr. McCunney's suggestion that annoyance is primarily related to attitudes about the visual impact of wind turbines and economic benefit does not explain why so many complaints about wind turbines relate to night-time periods when people are trying to sleep and not looking at wind turbines.

[79] The Appellant observes that Dr. McCunney did not address a disease entity in the ICD-10, known as R45, which lists symptoms and signs involving the following emotional states: nervousness and nervous tension; restlessness and agitation; unhappiness and worries; demoralization and apathy; irritability and anger; hostility; physical violence; an unspecified state of emotional shock and stress; and suicidal ideation tendencies. The Appellant submits that many of the symptoms and signs in ICD-10 R45 can be used to describe chronic annoyance, which can be defined as an unpleasant mental state that is characterized by such effects as irritation and distraction from one's conscious thinking, and can lead to emotions such as frustration and anger. In the Appellant's view, the property of being easily annoyed is called irritability.

[80] The Appellant disagrees with Dr. McCunney's statement that the health-related WHO documents do not indicate that the WHO considers annoyance an adverse health effect. The Appellant cites a 2004 WHO report entitled "Noise effects and morbidity" ("WHO Noise Report"), noting that it makes the following statements: a central effect of noise is annoyance; annoyance is defined as a feeling of discomfort related to adverse influencing of an individual or a group by any substances or circumstances; annoyance expresses itself by "malaise, fear, threat, trouble, uncertainty, restricted liberty experience, excitability, or defenselessness"; and with chronically strong annoyance, a causal chain may exist between the three steps of health, annoyance and disease.

[81] The Appellant notes the similarity of the list of ways annoyance expresses itself to the list of symptoms and signs in ICD-10 R45, linking "unhappiness" to uncertainty, "irritability and anger" to excitability, "demoralization and apathy" to defenselessness, "hostility" to threat, and "physical violence" to trouble. The Appellant observes that the WHO Noise Report concludes that: for chronically strong annoyance, a causal chain exists between the three steps of health, strong annoyance and increased morbidity; adults with strong annoyance experience significantly elevated relative risks in the cardiovascular system, the respiratory system, and the musculoskeletal system as well as risk of depression; elderly people with strong annoyance respond less than other adults, with the exception of stroke victims; and with children, the effects of noise are

seen primarily in the respiratory system. The Appellant submits that sleep can be severely disturbed by noise, and that noise-induced sleep disturbance is linked to other health risks.

[82] The Appellant's submissions concerning the failure of protective processes and the government's acknowledgement of adverse health impacts are based on the evidence of Ms. Wilson. The Appellant reviews her evidence based on her report analyzing two tranches of incident reports and staff notes obtained from the MECP. The Appellant submits that these reports do not support the Ontario government's 2017 promise that it would enforce noise regulations and follow up on reports of wind turbine noise. The Appellant states that there were more complaints than those officially recorded, noting Ms. Wilson's evidence that several Ministry district offices did not track all incident reports. The Appellant submits that the requirement in renewable energy approvals that wind power project operators provide descriptions of measures taken to address the cause of each incident is not being followed because many of these complaints are repeated multiple times.

[83] The Appellant notes that Ms. Wilson, in calculating that 35% of incident reports noted that people were suffering from sleep disturbance and adverse health effects, did not assume that when people called in the middle of the night to report excessive noise their sleep was disturbed, but submits that could be a reasonable assumption. The Appellant refers to Ms. Wilson's evidence that sleep disturbance is known to be a risk factor for serious health issues and for safety.

[84] The Appellant asserts that the MECP's Noise Guidelines state that wind turbines are not to be treated as tonal or cyclic in nature and, as a result, the prescribed penalty of 5 dBA was not applied under instruction from upper management and staff were virtually instructed not to take any action in situations they observed as problematic or which could be a risk to human health.

[85] The Appellant submits that the MECP is incorrect in its claim that there are no direct health effects associated with wind turbine noise emissions, referencing Ms. Wilson's evidence concerning the findings of the 2010 CMOH Report and the Health Canada Study. The Appellant notes Ms. Wilson's testimony that there have been so many noise complaints in Huron County, Ontario, that the Health Unit there has undertaken an ongoing public health investigation; an interim report issued in July 2018 showed that 60% of respondents were experiencing adverse health effects from exposure to wind turbine noise. The Appellant submits that, given the thousands of unresolved noise complaints in Ontario and the fact that study results demonstrate adverse health effects among people living in or near wind power project areas, it is reasonable to conclude that the Project will also cause similar problems and adverse effects.

[86] The Appellant reviews Ms. Wilson's evidence in response to Dr. McCunney's claim that low-frequency noise and infrasound are not unique to wind turbines and are not harmful, and submits that: there is confirmation from government sources (including the Canadian Council of Academies and Health Canada) that wind turbines do emit tonal or cyclic noise; that the range of noise emissions from industrial-scale wind turbines may be said to be unique or distinctive, and that wind turbine noise generally can result in annoyance as an adverse health effect linked to health impacts that are measurable and documented.

[87] The Appellant submits that the Tribunal should give very little weight to Dr. McCunney's evidence, because: his evidence that wind projects using Ontario setbacks is not consistent with records of complaints in Ontario or relevant studies showing evidence of health impacts from wind turbines; he has worked with the wind industry and received a CanWEA grant; he is not a specialist in any of the pre-existing conditions raised and has not personally examined any member of the community; and as he lives near a wind turbine and has not experienced any health impacts, his personal experience could have affected his professional opinion.

[88] In summary regarding the health effects of noise, the Appellant submits that, on the balance of probabilities, the construction and operation of the Project will result in adverse health effects on the 790 non-participating families within 2 km of the proposed Project, who make up the nearby population. The Appellant further submits that, given the thousands of unresolved noise complaints and reports of adverse health effects, it is not reasonable to conclude there will be no harm to human health.

[89] The Appellant's submissions on safety, regarding blade failure debris and ice throw, refer to the evidence of Mr. Pethke, Mr. Winters, Ms. Renaud, and Mr. Little, as well as the opinion evidence of Mr. Martin and Mr. Palmer.

[90] The Appellant states that the Approval Holder has not prepared any preventative mitigation to protect Mr. Pethke, his spouse or clients, confirmed in Mr. Little's testimony that mitigation was not considered in the siting of proposed turbine T28 and no protections were added for equestrian riders. The Appellant further states that the Approval Holder indicated in its PSA that there will be no adverse impacts due to the very low probability of ice throw occurring. The Appellant submits that while the Approval Holder failed to produce a study to show the potential risk and impacts as a result of ice throw or debris from blade failure, one was completed for the Approval Holder's South Branch Wind Farm, a neighbouring project in Brinston, Ontario, which demonstrates that the risk of serious harm exists. The Appellant notes that the turbines in the Project will be 200 m and therefore even taller than the South Branch turbines that are 128 m tall.

[91] The Appellant refers to Mr. Winters' and Ms. Renaud's concerns about safety in the event of flying ice or debris and observes, with respect to Mr. Little's evidence, that as an employee of the Approval Holder, he has a vested interest in the Project's completion, regardless of unintended health consequences for non-participating landowners. The Appellant submits that the design of the project represents a lack of respect for the majority of the community, and that Mr. Little's participation in CanWEA's lobby days at Queen's Park indicates his bias as a witness. The Appellant further

submits that Mr. Little failed to deliver on his promises about communicating with people and answering their questions, and did not adequately address the concerns of Ms. Renaud or Mr. Pethke. The Appellant asserts that Mr. Little's comments about the Project's ice protocol were general, vague and of insufficient detail to know what plan will actually be in place and whether it will be acceptable.

[92] The Appellant refers to Mr. Martin's evidence that industrial wind turbine failures have occurred and will continue to occur in the future based on the fundamentals of mechanical engineering, noting that he raised his concerns in the context of his duty as a professional engineer to protect the public welfare. The Appellant further refers to Mr. Martin's evidence that preventative measures do not refer to post-failure activities but to activities done in advance to ensure that the scope of any damage resulting from a failure is limited to a location where such debris can't cause damage, physical harm or death.

[93] Based on Mr. Martin's evidence that this issue should not be obfuscated by claiming that catastrophic wind turbine failures are rare, the Appellant submits that it is important to have a stringent safety philosophy due to the potential impacts on the public, and that it is inadequate to site industrial wind turbines less than 100 m from roads and other locations where the public could be present. The Appellant notes Mr. Martin's testimony concerning the catastrophic failure of a 1.5 MW turbine in Chatham-Kent earlier in 2018, submitting that even with a regular maintenance regime, failures can and do happen and that, since there is no containment mechanism that would limit the debris field, an adequate separation distance to neighbouring properties and roadways is the best preventative option.

[94] Regarding Mr. Palmer's evidence on property setback requirements, the Appellant submits that wind turbines in Ontario have failed during a number of events, in which the setback distances were not sufficient to prevent the possibility of adverse impacts, observing that Mr. Palmer took photographs and affixed his Licensed Professional Engineer's seal on his drawings in relation to the May 4, 2018 blade failure

on a Vestas Wind turbine in the Huron Wind turbine array. The Appellant submits that Mr. Palmer's drawing demonstrates that an individual or livestock could have been injured well beyond the recommended minimum setback and as far away from the turbine as 560 m.

[95] Referring to Mr. Palmer's opinion evidence that the occurrence of 9 incidents in Ontario since 2007 is a failure rate of about 9 failures in 12,500 turbine years, and given this probability of occurrence, the Project's 33 turbines can expect 1 (rounded) failure over a 25-year operating window, the Appellant asserts that the data is sufficient to show a mature failure rate. The Appellant notes Mr. Palmer's evidence about probabilistic and deterministic risk assessment techniques, and submits that while probabilistic risk of sure injury may be low because failed and falling blade parts will not actually hit every location outside the setback, even low probabilistic risk is a risk to the health of neighbours who must live near the wind turbine array. The Appellant submits that the deterministic basis simply asks if an accident can happen and what barriers are required to prevent it and further submits that, in Canada, the individual risk assessment is conducted as a deterministic risk assessment and, at distances of hub height or blade length plus 10 m, an accident fails the deterministic test. The Appellant observes that similar arguments can be made regarding the projection of ice pieces from a turbine.

[96] The Appellant submits that nothing in the preventative mitigation measures will preclude the possibility of injury, and that an ERP put into effect after an accident has no mitigating effect on protecting a person who might be present and has every right to be present on their property. The Appellant states that the only way residents can currently protect their own safety is to restrict the use of their property, which amounts to expropriation of the use of their property without compensation.

[97] The Appellant also refers to Mr. LeBlanc's opinion evidence, noting his responsibility to express opinions only about matters in which he has special knowledge, and that he should not omit to consider material facts that could detract from his conclusions and make it clear when a question or issue falls outside his

expertise. The Appellant submits that Mr. LeBlanc's expertise in the area of wind turbine mechanical design and technology appeared unsteady. The Appellant notes that Mr. LeBlanc described risk assessment as it related to the financial risk of a project not being on schedule or meeting performance criteria, rather than in relation to public safety risk.

[98] The Appellant states that Mr. LeBlanc's testimony that there is a critical 220 m distance beyond which there is negligible risk of injury from ice throw, appears to be based on a 2007 calculation in respect of a rotor diameter of 80 m, while the proposed rotor diameter for the Project is 136 m, which is a significant increase. The Appellant further states that Mr. LeBlanc relied on routine maintenance to solve any future blade deterioration problems, but points out that all turbines that suffered failures had similar maintenance protocols and used SCADA systems.

[99] The Appellant asserts that Mr. LeBlanc testified that the risks of fire and of blade failure were very low but failed to expand or quantify that risk. The Appellant further asserts that Mr. LeBlanc relied on the Dutch Handbook, a study of Dutch and German wind turbines in 2006 and 2010 to determine failure rates, despite hearing evidence based on wind turbine performance in Ontario in local climate conditions. The Appellant also observes that Mr. LeBlanc's evidence did not give any alternative calculation of risk based on the available data.

[100] The Appellant characterizes Mr. LeBlanc's evidence as suggesting that the manufacturers Enercon and Vestas should be trusted because of their market share, innovation and good track record, but submits that Canadian data indicates that these manufacturers have had recent blade failures, fires and collapses. The Appellant asserts that Mr. LeBlanc failed to adequately address these concerns and did not seem to be familiar with turbine failures in Quebec. The Appellant further submits that Mr. LeBlanc did not initially address known blade failures and fires with respect to current Vestas or Enercon wind turbine models, and only acknowledged the failures on cross-examination.

[101] The Appellant submits that Mr. LeBlanc was vague in his evidence and drew general conclusions about specific wind turbine blade failures, with no qualification of metrics using hard data, and further submits that he relied heavily on Mr. Little's evidence in assessing this specific project despite Mr. Little's vested interest in the outcome of this case. The Appellant states that Mr. LeBlanc admitted that accidents are possible, noting that the terms of the REA specifically require the PSA to address the possibility of adverse impacts. The Appellant asserts that, when asked if he would agree that an engineer has a duty to protect and to take near misses as significant, Mr. LeBlanc replied that there is a possibility of any accident and that mitigation reduces the probability.

[102] In summary regarding safety, the Appellant submits on the balance of probabilities that the Project will cause serious harm to human health based on the significant risk that safety incidents, which would negatively impact human health, are probable, especially as related to ice and debris fling, and the proximity to abutting properties and roadways, and the size and speed of the moving or stationary turbine blade tips and the large debris field measured at other Ontario sites.

Approval Holder's Submissions

[103] The Approval Holder submits that the Appellant's health appeal is not supported by any expert evidence and is rooted in the unsubstantiated generic allegation (not specific to any project) that sound generated by all wind farms causes serious harm to human health, and that the Project will therefore produce those results in the surrounding community. The Approval Holder asserts that, at its highest, the evidence, from the Presenters, Participant and the Appellant's witnesses, amounts to general, lay expressions of concern about the potential for harm, and that this does not rise to meeting the legal test. The Approval Holder notes that, although it bore no onus on the appeal, it led expert evidence from Dr. McCunney establishing that the Project, when operated in accordance with the REA, would not reasonably be expected to harm

human health. The Approval Holder further submitted that the Appellant has fallen far short of meeting its onus of proving that the Project, when operated in accordance with its REA, will cause serious harm to human health.

[104] The Approval Holder refers to Dr. McCunney's opinion evidence regarding the potential health impact of the Project, noting in particular the following conclusions of the 2009 and 2014 literature surveys that he co-authored: sounds emitted by wind turbines are not unique and there is no reason to believe that these sounds could plausibly have direct adverse health consequences; the body of accumulated knowledge about sound and health is substantial; this body of knowledge provides no evidence that the audible or sub-audible sounds from wind turbines have any direct adverse physiological effects; measurements of low-frequency sound, infrasound, tonal sound emission and amplitude-modulated sound show that infrasound is emitted by wind turbines but the levels of infrasound at customary distances to homes are typically well below audibility thresholds; no cohort or case-control studies were located in the literature but, among the better quality cross-sectional studies, no clear or consistent association is seen between wind turbine noise and any reported disease or other indicator of harm to human health; components of wind turbine sound, including infrasound and low-frequency sound, have not been shown to present unique health risks to people living near wind turbines; and annoyance associated with living near wind turbines is a complex phenomenon relating to personal factors, and turbine noise plays a minor role compared with other factors in leading people to report annoyance in this context.

[105] The Approval Holder submits that Dr. McCunney has followed the relevant scientific literature since 2014 and is unaware of any studies which would change the conclusions of his 2009 and 2014 literature surveys; instead, recent studies have confirmed those conclusions and the Health Canada Study investigators concluded, based on their review of measured stress levels with serum cortisol, blood pressure and heart rate and objectively measured sleep, that there was no evidence of a causal link

between living near wind turbines and either increased stress or increased sleep disturbances.

[106] The Approval Holder summarizes in detail Dr. McCunney's review and responses to the concerns raised by the Participant and Presenters, noting his conclusion that there was no merit to their concerns regarding the potential impact of wind turbine noise on the various pre-existing health conditions presented.

[107] The Approval Holder responds to the submissions of the Appellant, noting that the Health Canada Study and the Council of Canadian Academies Report have been considered previously by the Tribunal and, in each case, the Tribunal has found that their findings and conclusions are insufficient to establish that wind turbine noise at the levels expected at the Project will cause serious harm to human health. Regarding the anecdotal evidence of complaints about wind turbine noise, vibration and sensation, the Approval Holder asserts that the Tribunal has repeatedly held that while lay witnesses may testify to the symptoms they experience, the evidence of a health professional is necessary to confirm the medical conditions from which they suffer and their cause, whether due to sound pressure levels directly or to annoyance. The Approval Holder observes that no such confirmatory evidence was provided, and that Dr. McCunney's evidence casts significant doubt on the association suggested by the Appellant between wind turbines and adverse health effects. The Approval Holder further states that the Appellant's anecdotal hearsay evidence is even weaker than the direct testimony that the Tribunal has repeatedly found to be insufficient to demonstrate causation and should be given no weight.

[108] The Approval Holder refutes a number of the Appellant's critiques of Dr. McCunney's evidence. The Approval Holder further responds to the Appellant's submissions accusing Dr. McCunney of bias, submitting that these allegations are entirely without merit and that: Dr. McCunney presented his evidence in a forthright manner, supported his opinions with references to his experience and the relevant medical literature and responded directly and honestly to questions posed to him on

cross-examination and by the Tribunal; the CanWEA grant relating to the 2014 literature survey was directed to MIT and not to him personally; and Dr. McCunney did not agree that his personal experience could have affected his professional opinion, instead testifying that his opinion was based primarily on his scientific background as a physician and on his understanding of the literature.

[109] Regarding noise, the Approval Holder concludes that expert evidence conclusively establishes that the Project when constructed and operated in accordance with the REA will not cause adverse effects to human health, submitting that the evidence from the Participant, Presenters and Appellant's witnesses was limited to expressions of concern that were at best speculative and fall far short of establishing that engaging in the Project in accordance with the REA will cause serious harm to human health.

[110] The Approval Holder submits that the Appellant's concerns about certain risks to public safety, in particular the potential for injury resulting from blade failure and ice throw, was speculative and established only that these events might occur, without regard to the probability that they would result in harm to human health or the fact that such harm has never occurred at any project. The Approval Holder stated that the Appellant's evidence establishes the potential for harm to human health only if equipment fails, that failure results in equipment detachment, the detachment travels in a certain trajectory, and a person is present at the point of impact. The Approval Holder further states, however, that the Appellant's witnesses have not assessed the probability of any of these events occurring at the Project, let alone in combination, and have instead simply assumed that any equipment failure will result in harm.

[111] The Approval Holder asserts that, at its highest, this evidence raises only general concerns in respect of potential risks, which the Tribunal has repeatedly held are not sufficient to meet the legal test, and further asserts that the Appellant's evidence was contradicted in every respect by the Approval Holder's expert evidence establishing that there are no significant risks of harm from the Project when operated as approved. The

Approval Holder notes that, while it bears no onus on this appeal, it led expert evidence that established that the risk of harm resulting from blade failure or ice throw at this Project is very low. Referring to Mr. LeBlanc's evidence that he is not aware of anyone having been injured by blade failure or ice throw at any project (based on more than 1.28 million years of wind turbine operation as of July 2018) and that the risk of such harm is very low, the Approval Holder asserts that this underscores the extremely remote probability that these events would cause harm at the Project.

[112] Regarding Mr. Martin's evidence, the Approval Holder submits that the Tribunal should prefer Mr. LeBlanc's evidence that wind turbines are highly sophisticated machines whose value depends on their proper design, maintenance, installation and operation, and further that industrial fans and wind turbines are operated differently, are fabricated with different materials, have different aerodynamic properties and serve completely different functions. The Approval Holder notes that Mr. Martin sought to be qualified as an expert in "turbo-machinery" but that the Tribunal limited his qualification to "an engineer with expertise in large industrial fans."

[113] The Approval Holder submits that Mr. Palmer is a professional engineer who worked most recently as a Training Superintendent and Shift Supervisor for Ontario Power Generation at the Bruce nuclear facility until his retirement in 2004, and has not taught any formal courses or published on the subject of risk assessment in relation to wind turbines. The Approval Holder further submits that Mr. Palmer was qualified as a "professional engineer with expertise in public safety risks due to turbine failure," and has never been involved in the development of a wind project or retained to conduct a risk assessment on wind projects.

[114] The Approval Holder observes that both Mr. Martin and Mr. Palmer are personally opposed to wind turbines, and asserts that expert witnesses have a duty to provide evidence that is fair, objective and non-partisan, as set out in the Tribunal's Practice Direction for Technical and Opinion Evidence, and Acknowledgement of Expert's Duty (Form 5). The Approval Holder contends that, where expert evidence has

been admitted, the Tribunal must take concerns about an expert's independence and impartiality into account in weighing the evidence at the gatekeeping stage.

[115] The Approval Holder submits that Mr. LeBlanc's evidence regarding the potential risk of harm at the Project due to blade failure and ice throw should be preferred over that of Mr. Palmer and Mr. Martin for at least three reasons: Mr. LeBlanc is the only expert witness who has experience assessing the public safety risk associated with potential wind turbine equipment failure and ice throw; there are serious concerns about the ability of Mr. Martin and Mr. Palmer to provide testimony which is fair, objective and non-partisan due to their opposition to wind turbines; and only Mr. LeBlanc addressed the relevant issue on this appeal, that being the probability that equipment failure or ice throw would result in harm to human health. The Approval Holder further submits that the Tribunal has rejected, in three past proceedings, Mr. Palmer's approach to risk assessment as presented in his evidence, on the basis that by failing to address the probability that a person would be present and affected by equipment failure or ice throw, his risk analysis can only establish that harm may occur and not that it will occur. The Approval Holder states, therefore, that the assumption by Mr. Palmer and Mr. Martin that any equipment failure or ice throw will result in harm falls short of the statutory test.

[116] The Approval Holder reviews Mr. LeBlanc's evidence responding to the concerns raised by the Presenters and Appellant's witnesses, submitting that the incidence of blade failure, which is very low, is not the same as the probability of injury resulting from blade failure, which is far lower. The Approval Holder refers to Mr. LeBlanc's testimony that the probability of all of the events happening simultaneously (blade failure, detachment of blade or portion, trajectory of blade portion and person being present where blade portion impacts the ground) that would have to occur to result in injury is extremely remote.

[117] The Approval Holder asserts, based on Mr. LeBlanc's evidence that improvements in blade technology, manufacturing and inspection processes have led to a decrease in the rate of blade failure, and technological improvements have resulted in a decrease in severity in the rare cases when blade failure does occur. The Approval Holder notes the evidence of Mr. LeBlanc and Mr. Little that the Project Turbines are modern, considered safe and reliable in the industry, and that the Approval Holder will employ proactive and preventative blade monitoring at the Project to allow it to detect any abnormalities, in the unlikely event they exist, before any failure occurs.

[118] The Approval Holder submits, based on Mr. Little's testimony, that modern wind turbine blades are designed to reduce the risk of potential ice build-up and to protect against potential damage resulting from ice build-up by shutting down automatically when their sensors detect ice formation, and requiring a visual inspection before being restarted. The Approval Holder further submits that it has significant experience managing wind projects subject to icing events, and that the Project Turbines are designed to operate in cold climates and it will use meteorological data to predict weather conditions at the Project each day. The Approval Holder put forward Mr. LeBlanc's opinion evidence that the probability of a person being present in the exact vicinity of an ice throw event is very low and that he is not aware of any such injury ever having occurred.

[119] Regarding the issue of public safety, the Approval Holder submits that the Appellant has fallen far short of meeting its onus under s. 145.2.1(3) of the *EPA* of establishing that the Project will cause serious harm to human health. The Approval Holder responds to the Appellant's concern about preventative mitigation and setbacks by referring to Mr. LeBlanc's evidence that the Approval Holder designed the turbine layout to exceed provincial requirements with respect to setback distances from dwellings and roads, and to ensure that the turbines would not result in any adverse impacts to nearby businesses, infrastructure, properties and land uses. With respect to the Appellant's quote from a 2007 report by Mr. LeBlanc, which references a critical 220 m "safe" distance beyond which there is a negligible risk of injury from ice throw,

the Approval Holder notes Mr. LeBlanc's evidence that this "critical distance" is used to define a "zero risk of harm" and does not mean that persons travelling within this critical distance will be harmed by blade failure or ice throw as the probability of such an incident must still be assessed and is very low.

[120] The Approval Holder states that the Appellant's allegations that Mr. Little is biased, and failed to deliver on promises, are unfounded. The Approval Holder submits that Mr. Little, as a fact witness, testified candidly and answered cross-examination questions directly and honestly, and adds that the Appellant did not identify any aspect of his testimony that was inaccurate or affected by the alleged bias. The Approval Holder further notes Mr. Little's evidence that, while the Approval Holder was not able to address all community concerns and requests, it accommodated requests where possible.

Director's Submissions

[121] The Director submits that the Appellant did not put forward any evidence that the Project as approved will cause the serious harms to human health alleged in its notice of appeal; instead, the Appellant's health evidence mainly consisted of expressions of concern by lay persons about the potential health effects of wind turbines. The Director asserts that, under s. 145.2(3) of the *EPA*, the onus is on the Appellant to prove that engaging in the Project in accordance with the REA will cause serious harm to human health on a balance of probabilities and not that it *may* or *is likely* to occur. The Director states that evidence that only raises the potential for harm does not meet the onus of proof, and mere speculation about possible effects also does not meet this threshold.

[122] Noting that the Appellant did not call any medical experts to support its allegation of harm to human health, relying solely on the testimony of lay persons, the Director submits that the diagnostic skills of a qualified health professional are required to confirm medical conditions amounting to serious harm. The Director takes the position that lay persons may give evidence about existing medical conditions or symptoms, but

their subjective evidence alone cannot be relied upon to make the link between their health and wind turbines. The Director says that, because a finding that wind turbine noise will cause serious harm to human health is a medical conclusion, expert evidence is required to support such a conclusion. The Director observes that, while the witnesses, Presenters and Participant have honest concerns about the potential noise impacts, this type of evidence on its own does not meet the statutory test in s. 142.1(3) of the *EPA*.

[123] The Director states that the only medical professional called to testify at the hearing was Dr. McCunney, who reviewed the concerns of each lay person and stated that he is not aware of any scientific or medical literature that shows that proximity to wind turbines causes the adverse effects about which they were concerned. The Director notes the conclusion of the Health Canada Study, which is consistent with Dr. McCunney's literature surveys, that there is no association between wind turbines and a number of health conditions, and that while there was an association observed for annoyance, there was no finding that was sufficient to establish causation. The Director submits that this conclusion is consistent with the many past decisions of the Tribunal that have considered the potential health impacts of noise from wind turbines. The Director further submits that those decisions have upheld the consensus scientific view that there is no evidence that industrial wind turbines adversely affect human health when sited in accordance with appropriate setback distances and noise level standards. The Director contends that while each case ultimately must be decided on its own facts, the Appellant has not presented any evidence that should cause the Tribunal to revisit the consensus scientific view.

[124] The Director notes that some of the lay witnesses attached documents or referenced materials on the internet that address the relationship between human health and wind turbines, and that the Tribunal admitted these documents to establish the basis for their concerns and not for the truth of their contents. The Director submits, however, that the Appellant relies heavily on these unsubstantiated materials in its closing submissions. The Director asserts that this is an improper use of this

information and is contrary to the Tribunal's direction that the studies were being admitted for the purpose of establishing the basis for the layperson's concerns and not for the truth of their contents. The Director takes the position that, to the extent that the Appellant is asking the Tribunal to use these materials to draw substantive conclusions, it must be disregarded. The Director points out that unless documents and articles are introduced through the evidence of a qualified expert witness, no weight can be given to the conclusions and opinions set out in them. The Director notes examples where the Appellant has relied upon assertions for which there was no evidence, and relies upon a report in its closing submissions that he contends was not tendered by any witness.

[125] Referring to the evidence of Ms. Wilson, the Director asserts that her study is based on hearsay evidence obtained by reviewing MECP incident reports and that, while hearsay evidence is admissible in administrative hearings, it still must be credible. The Director notes that Ms. Wilson does not provide any context for the information from the incident reports and equates a complaint of an adverse health impact with an actual adverse health impact, when her evidence does not indicate whether the alleged health impact was verified and a causal link identified between the impact and operation of the wind turbine. The Director submits that the Tribunal has previously determined that no conclusions can be drawn from self-reported complaints that have not been assessed or confirmed, and determined to be reliable in an epidemiological context.

[126] The Director observes that Ms. Wilson's evidence implies that the Ministry does not seriously enforce conditions imposed in renewable energy approvals and, while the Director categorically denies this assertion, he did not call evidence in rebuttal as he takes the position that it falls beyond the scope of the Hearing. However, counsel for the Director noted at the outset of Ms. Wilson's evidence that he would be objecting in closing submissions to that aspect of her evidence. The Director states that Condition C1 of the REA requires the Project to operate such that sound levels are below 40 dBA at receptors when wind speeds are below 7 m per second, and these sound levels are consistent with the MECP's Noise Guidelines. The Director submits that there is no evidence that the Project will exceed these sound levels and, in any event, the Tribunal

must consider the evidence on the assumption that they will be met. The Director further submits that Conditions E and F require the Approval Holder to conduct noise immission and emission testing, and this actual data will be used to determine whether the Project is being operated in compliance with the REA and whether noise complaints, if any are received, are justified. The Director asserts that this is the type of information necessary to evaluate noise complaints and that it is completely lacking in Ms. Wilson's report. The Director further asserts that if noise levels are determined to be excessive, the MECP will require mitigation measures to be implemented.

[127] Regarding public safety, the Director disputes the Appellant's assertion that blade failure is likely to occur, and that if does occur, it is likely to cause harm to human health, submitting that the evidence demonstrates that such an event will be a rare occurrence, and further that it is highly unlikely to cause actual harm. Noting Mr. LeBlanc's evidence that industrial fans and wind turbines are not analogous, the Director submits that Mr. Martin's conclusion that failures have occurred and will continue to occur for industrial fans does not mean that the same can be said about wind turbines.

[128] The Director reviews Mr. Palmer's evidence and asserts that he does not provide any assessment of the likelihood that a turbine failure will cause harm to human health, contending that the likelihood of such harm occurring is very small and no more likely than harm occurring from incidents such as debris falling from buildings, bridges or high-voltage electric lines. The Director notes that Mr. Palmer acknowledged under cross-examination that there have not been any incidents in Ontario where a person has actually been harmed by debris from a wind turbine and submits therefore that, using Mr. Palmer's methodology, the current likelihood is zero. The Director points out that previous Tribunal decisions have indicated that it is insufficient to demonstrate that a particular event that may cause harm may occur; instead there must be evidence as to the likelihood that an event that causes ice or debris to be flung from a turbine will also cause harm to human health to meet the test in s. 142.1(3) of the *EPA*.

[129] Regarding Mr. Palmer's "deterministic risk assessment" concept, the Director asserts that it is not supported by any academic literature or industry standards, and so there is no evidence that this concept is used elsewhere or that it is a concept upon which the Tribunal can rely. The Director further asserts that the concept does not address the concern addressed in previous Tribunal decisions that the probability of an incident occurring must be considered in conjunction with the probability that harm will actually occur, and that this concept should therefore be disregarded and the Tribunal should follow the traditional analysis the Tribunal has utilized in other decisions.

[130] The Director notes the evidence of Mr. Little and Mr. LeBlanc concerning the following preventative measures that will be in place: continuous automated blade monitoring; visual inspections; and weather monitoring. The Director further notes Mr. LeBlanc's evidence that improvements in blade design have been implemented by wind turbine manufacturers in recent years, further reducing the likelihood of blade failure occurring, as well as his evidence that the Project will not pose any significant risk of blade failure or ice throw.

[131] The Director submits that, regarding noise and human health, the Appellant's witnesses, the Participant and the Presenters have raised concerns about the potential for harm from the Project but have failed to put forth sufficient evidence to satisfy the statutory test. Similarly, the Director submits that the Appellant's public safety witnesses and the presenters have tendered evidence that the Project could possibly cause harm but have failed to provide evidence to satisfy the statutory test that the Project will cause serious harm. Therefore, the Director contends that the Appellant has thus not met its onus of showing that engaging in the Project in accordance with the REA will cause serious harm to human health.

Analysis and Findings

Health Test

[132] Regarding the health and public safety issues raised by the Appellant, s. 145.2.1(2)(a) and (3) of the *EPA* set out the legal test (“Health Test”) the Appellant must meet: it has the onus of proving that engaging in the renewable energy project in accordance with the REA will cause serious harm to human health. The Health Test has been the subject of much analysis in past Tribunal renewable energy approval decisions. As the Approval Holder notes in its submissions, a number of principles were developed in these past decisions in respect of the Health Test, which the Tribunal adopts in this case. These include the following:

- evidence that the Project at issue may cause, or has the potential to cause, serious harm to human health is not sufficient to meet the “will cause” aspect of the Health Test (see *Erickson v. Director (Ministry of the Environment)*, [2011] O.E.R.T.D. No. 29 (“*Erickson*”) at para. 521 and *Monture v. Director (Ministry of the Environment)*, [2012] O.E.R.T.D. No. 50 at para. 70);
- the burden of proof is the balance of probabilities, meaning that the Appellant has the onus to demonstrate that it is more likely than not that engaging in the Project in accordance with the REA will cause serious harm to human health; the Tribunal does not demand a level of scientific certainty (see *Kroeplin v. Director (Ministry of the Environment)*, [2014] O.E.R.T.D. No. 24 (“*Kroeplin*”) at para. 197);
- the Appellant need only prove that serious harm to human health will be caused, even if the exact mechanism by which the harm occurs is unclear (see *Erickson* at para. 819);
- the test is not whether there are inadequacies in the surveys and assessments submitted by the Approval Holder in support of its application for the REA, but inadequacies in surveys and assessments

may be a relevant consideration in evaluating whether the Health Test has been met (see *Haldimand Wind Concerns v. Director (Ministry of the Environment)*, [2013] O.E.R.T.D. No. 12, para 111); and

- the Tribunal must assume that the Project will operate in accordance with the REA, so evidence of harm caused by non-compliance will not be considered relevant (see *Kroepelin* at para. 195).

Noise Impacts

[133] The Tribunal finds, on the basis of the evidence before it, that the Appellant has not met the onus of proving that it is more likely than not that engaging in the Project in accordance with the REA will cause serious harm to human health due to impacts from noise. The Appellant has made assertions that noise impacts from the Project will cause serious harm to human health, but has not provided evidence of the nature that the Tribunal would require in order to make such a finding under the Health Test.

[134] With the exception of Ms. Wilson, whose evidence is addressed below, the evidence presented by the Appellant is entirely based on the testimony of members of the community in the area of the Project, including the witnesses called by the Appellant, the Participant and the Presenters (“community witnesses”). As described above, these witnesses testified to their genuine concerns about the potential impacts of noise from the Project turbines on themselves, their family members and others residing or otherwise spending time in proximity to the turbines. It is clear that all of the community witnesses are deeply concerned about the potential for impacts from noise associated with the Project.

[135] A number of the community witnesses relied upon and submitted documents, including scientific articles. In keeping with past Tribunal practice in renewable energy approval appeals, the Tribunal admitted these documents into evidence in order to allow these witnesses to establish the basis for their concerns. However, as in earlier renewable energy hearings, the Tribunal cannot accept these scientific articles for the

truth of their contents because the witnesses introducing them did not have the qualifications to interpret and explain them (for example, see *Lambton (County) v. Ontario (Ministry of the Environment and Climate Change)*, [2015] O.E.R.T.D. No. 10 at para. 79).

[136] Several of the community witnesses provided evidence about individuals with pre-existing conditions and their concerns that noise from the turbines will have particularly adverse impacts on these individuals, given their existing health conditions. The Appellant did not call any expert to provide evidence regarding these individual assertions of potential health impacts. The Approval Holder, however, did call Dr. McCunney to provide opinion evidence addressing the concerns about noise impacts on health.

[137] Dr. McCunney noted that he had not examined any of the individuals who were identified as having pre-existing conditions, but he did give evidence concerning the general health conditions raised by the community witnesses, including MS, heart conditions, hearing disorders, tinnitus and mental health. Regarding each of these conditions, based on his extensive review of research relating to health impacts and wind turbine noise, Dr. McCunney testified that he was not aware of any scientific studies or medical literature that demonstrate an impact from wind turbine noise on any of these pre-existing conditions. He further addressed the evidence of Ms. Wilson, setting out his conclusions that: the 2014 Health Canada Study found that wind turbine noise is not associated with self-reported sleep disturbance or disorders, self-reported illnesses and chronic health conditions, or self-reported perceived stress and quality of life; the 2010 CMOH Report was consistent with the 2014 Health Canada Study and with the conclusions in Dr. McCunney's 2009 and 2014 literature surveys; annoyance is not a health effect; and, as set out in the 2014 literature survey, annoyance associated with living near wind turbines is a complex phenomenon related to personal factors, and noise from wind turbines plays a minor role in comparison with other factors in leading people to report annoyance.

[138] On the basis of Dr. McCunney's extensive research and experience, the Tribunal accepts his opinion evidence that the current body of medical scientific research does not indicate that noise, including infrasound and low-frequency noise, from the Project, operated in accordance with the setback distances provided for in the REA, will result in serious harm to the health of any community members, including those with the pre-existing conditions raised at the hearing. The Tribunal was not provided with any expert evidence to contradict Dr. McCunney's opinion and his opinion was not seriously challenged on cross-examination. Furthermore, the Tribunal finds no indication of bias in relation to Dr. McCunney's evidence and notes that his evidence was well supported by his research and experience in the subject matter.

[139] Regarding Ms. Wilson's review of incident reports relating to wind turbine noise and her conclusion that the MECP does not respond to all complaints, the Tribunal notes that the Director raised an objection to this evidence during the hearing, on the ground that it was outside the scope of the Hearing, and denied her implication that the MECP does not seriously enforce conditions imposed in renewable energy approvals. Having considered this evidence, the Tribunal agrees with the Director that it falls beyond the scope of the REA hearing and, further, that Ms. Wilson appears to assume that a complaint of an adverse health impact is an actual adverse health impact. She provides no evidence verifying either the actual health impact on anyone who filed a complaint or a causal link between the impact complained of and the operation of a wind turbine.

[140] The Tribunal is satisfied that there are conditions in the REA to address potential concerns relating to noise impacts, including: Condition C1, which sets out requirements for turbine sound level limits; Condition E, requiring immission testing; and Condition F, requiring emission testing. In reaching its decision, the Tribunal must assume that the Approval Holder will comply with the conditions in the REA, based on the wording of the Health Test in the *EPA*, which requires the Tribunal to assume that a project will operate "in accordance with" the REA, so that evidence of harm caused by non-compliance will not be considered relevant (as discussed in *Kroepelin* at para. 195)..

[141] Based on the evidence provided in support of its case on noise impacts, the Tribunal finds that the Appellant has not met its onus of proving that it is more likely than not that the Project, operated in accordance with the REA, will cause serious harm to human health due to impacts from noise.

Public Safety

[142] As with noise, the Tribunal heard evidence from several community witnesses about their public safety concerns arising from the Project in relation to the potential for blade failure or ice throw from the turbines. The Tribunal also heard opinion evidence from Mr. Martin, a Presenter, and Mr. Palmer, an expert witness for the Appellant, with respect to these concerns, in addition to responding evidence from the Approval Holder.

[143] The Tribunal has addressed concerns about public safety in past hearings, and stated in its decision in *Wrightman v. Ontario (Ministry of the Environment)*, [2014] O.E.R.T.D. No. 11 (“*Wrightman*”), at para. 165, that the key components of a risk assessment are: to identify plausible events that could cause serious harm to human health; determine the probability that such types of event will occur; and determine the probability that such an event, if it did occur, will cause serious harm. The Tribunal further stated, in *Wrightman*, that it would consider whether mitigation measures are available to reduce risk and, if so, to what extent. The Tribunal must assess whether it is more likely than not that the Project, operated in accordance with the REA, will cause injury due to debris from blade failure or ice throw.

[144] As noted above, Mr. Martin was qualified to provide expert evidence as an engineer with expertise in large industrial fans. Having heard and assessed his evidence, the Tribunal prefers Mr. LeBlanc’s opinion evidence concerning the many differences between industrial fans and wind turbines, set out in the summary of Mr. LeBlanc’s evidence above, and is satisfied that the types of causes of industrial fan

failure noted in Mr. Martin's evidence are mitigated with respect to wind turbines due to equipment design and monitoring, as discussed by Mr. LeBlanc.

[145] The Tribunal has carefully reviewed and assessed the two different approaches to risk assessment, summarized above, in the evidence of Mr. Palmer and that of Mr. LeBlanc. Mr. Palmer concluded that the Project could expect one failure over a 25-year operating window, and that the Project's setback distances are not adequate to prevent harm to human health from blade failure debris or ice throw. Mr. LeBlanc, in contrast, concluded that the Project will not pose any significant risk of blade failure or ice throw. He questioned Mr. Palmer's use of a deterministic approach to evaluating public safety risk, providing his opinion that this approach only considers the possibility of a blade failure event occurring at the Project without considering the likelihood that such an event will cause harm to the public.

[146] Regarding Mr. Palmer's evidence, the Tribunal notes that he provided similar evidence in other Tribunal hearings, which was evaluated by the Tribunal in several previous renewable energy approval decisions, including *Mothers Against Wind Turbines Inc. v. Ontario (Ministry of the Environment and Climate Change)*, [2015] O.E.R.T.D. No. 19 ("MAWT"). In MAWT at para. 232, the Tribunal stated that the test it must apply is not whether the Project meets the safety assessment standards described by Mr. Palmer, but whether engaging in the Project in accordance with the REA will cause serious harm to human health. In MAWT, at para. 232, and other past cases, the Tribunal did not accept that:

when determining whether the "will cause" requirement of the Health Test has been established, the Tribunal should assume a person will be present, where it is established that an adverse event is possible. Instead, in applying the Health Test, the Tribunal must consider both the probability that an adverse event will occur, together with the probability that a person will be impacted by such an adverse event. Therefore, where Mr. Palmer's analysis does not include consideration of the likelihood whether a person may be present when an adverse event occurs, such analysis is insufficient to establish that harm *will* occur. It can only establish that harm *may* occur.

[147] The Tribunal finds that the reasoning in *MAWT* also applies in this case in relation to Mr. Palmer's evidence, and adopts that reasoning. Mr. Palmer's evidence calculating public safety risk did not consider the likelihood of whether a person may be present when an adverse event occurs.

[148] The Tribunal notes Mr. LeBlanc's 16 years of engineering experience in the wind energy field, including in the design, configuration and optimization of wind farms, and the review and assessment of technical risk with respect to wind projects in project development, construction and operation. The Tribunal further notes that he is the author of a report on risk assessments of ice throw and blade failure that has become a standard reference in the renewable energy industry. The Tribunal finds that Mr. LeBlanc's expertise and knowledge is more reliable on the public safety aspects of wind turbines than that of Mr. Palmer.

[149] The Tribunal prefers the opinion evidence of Mr. LeBlanc, who indicated that Mr. Palmer's calculation of risk for the Project was statistically flawed and should be not be used to predict future failure because Mr. Palmer's wind turbine sample size was too small to produce a statistically-reliable data set, and the number of failure events Mr. Palmer references is too small to produce a meaningful analysis. Mr. LeBlanc did consider the likelihood of whether a person may be present when an adverse event associated with a wind turbine occurs, noting that one must take into consideration: the probability of a blade failing; the probability of detachment from the turbine as part of that failure; the trajectory of the detached portion; and the probability of a person being present where the detached portion impacts the ground. Having reviewed information from more than 1.28 million years of wind turbine operation globally as of July 2018, Mr. LeBlanc testified that he was not personally aware of any such injury having occurred. The Tribunal accepts this evidence and further accepts his evidence that the Project turbines are known to be reliable and designed to operate in cold climates. Finally, the Tribunal is satisfied that the steps to be taken by the Approval Holder in designing and operating the turbines will mitigate the risk of blade failure and ice throw.

[150] Therefore, the Tribunal finds that the Appellant has not met its onus of proving that it is more likely than not that the Project, operated in accordance with the REA, will cause serious harm to human health due to blade failure or ice throw.

Conclusion on Issue 1

[151] The Tribunal concludes that the Appellant has not met its onus to prove that engaging in the Project, in accordance with the REA, will cause serious harm to human health with respect to noise impacts and public safety.

Issue 2: Whether engaging in the Project in accordance with the REA will cause serious and irreversible harm to plant life, animal life or the natural environment, specifically with respect to birds and bats

Evidence

Evidence of the Appellant

[152] The Appellant called Philippe Thomas to provide expert opinion evidence on this issue.

Philippe Thomas

[153] Mr. Thomas, a wildlife toxicologist with Environment and Climate Change Canada, was qualified to provide opinion evidence as an expert in wildlife biology and water toxicology. He reviewed the Natural Heritage Assessment (“NHA”) prepared for the Project and concluded that collision risks for birds were not adequately assessed in the NHA. In his evidence, Mr. Thomas cited several studies that estimate the mortality rate of birds per year due to collisions with land-based wind energy turbines, with rates ranging from 234,000 birds per year to 573,000 birds per year, depending on the modalities of each study.

[154] Mr. Thomas testified that the risk to birds is relatively low as long as the Project is not located near a sensitive or important habitat. He stated, however, that only the spring migration period (March 1 to April 30) was considered in the NHA, leading to an underestimation of the risk of collisions. Mr. Thomas testified that large waterfowl, such as Snow Geese, assemble in the Project area well into December, and inclement weather in the fall can contribute to increasing collision risks. Under cross-examination, Mr. Thomas acknowledged that the Snow Geese population has been rising, to about one million individuals at present. Mr. Thomas was of the opinion that there was a lack of detail in the NHA's avian record, stating that the records review omitted some species listed under the federal *Species at Risk Act*, such as the Barn Swallow, Eastern Meadowlark and Bobolink, despite the presence of these species near the Project location.

[155] Mr. Thomas also reviewed the NHA in respect of bats and concluded that the risk of bat mortality resulting from the Project was grossly underestimated. He referred to a recent study of Hoary Bats, which found that mortality from wind turbines may drastically reduce population size and increase the risk of extinction. Mr. Thomas also testified that direct contact with turbine blades is not the only source of bat mortality related to wind energy projects, stating that turbine blades move wind by creating a high pressure area next to a low pressure area, causing air to behave like a fluid, and the low pressure area produced behind a wind turbine is low enough to cause bats' lungs to implode. Mr. Thomas said that this phenomenon, known as barotrauma, is a form of lung damage resulting from the expansion of air in the lungs that is not accommodated by exhalation, and is the cause of death in a high proportion of bats found at wind energy facilities according to a study, "Barotrauma is a significant cause of bat fatalities at wind turbines" by Baerwald et al., *Curr Biol*, 2008, 18(16), p. R695-6 ("Baerwald study"), in which researchers demonstrated that air pressure changes at turbine blades are an undetectable hazard leading to barotrauma. He stated that the Baerwald study helps to explain high fatality rates in migrating bats.

Evidence of the Approval Holder

[156] The Approval Holder called three expert witnesses to provide expert opinion evidence on the wildlife issue: Andrew Ryckman, Dr. Paul Kerlinger and Dr. Scott Reynolds (The Director called no evidence on this issue).

Andrew Ryckman

[157] Mr. Ryckman, a terrestrial and wetland biologist at Natural Resource Solutions Inc. (“NRSI”), was qualified as a biologist with expertise in conducting environmental assessments of wind energy projects; he is the NRSI project manager for the Project. Mr. Ryckman stated that NRSI assessed potential risk to birds as part of the NHA and prepared a rigorous post-construction Environmental Effects Monitoring Program (“EEMP”). He noted that Conditions P1 and P2 of the REA require the Approval Holder to implement the EEMP and contact the Ministry of Natural Resources and Forestry (“MNRF”) if it is necessary to deviate from the EEMP for any reason. Mr. Ryckman further stated that an Operational Mitigation Plan (“OMP”) was created for the Project and submitted to the MNRF in accordance with s. 23.20 of O. Reg. 242/08, the general regulation under the *Endangered Species Act, 2007* (“ESA”). He noted that a considerable amount of additional bird survey work was done but not reflected in the NHA report.

[158] Mr. Ryckman confirmed that NRSI considered waterfowl and songbirds in conducting its environmental assessment of the Project, including the potential presence of stopover and staging habitat for migratory waterfowl, shorebirds, and landbirds. He also confirmed that NRSI considered species at risk (“SAR”), including Barn Swallow, Eastern Meadowlark and Bobolink. Mr. Ryckman discussed the general process that NRSI followed in its consideration of birds: a records review looking at the Breeding Bird Atlas, Natural Heritage Information Centre records and MNRF records for the area; identification of species potentially occurring in the vicinity of the Project based on the records review; and field surveys conducted in the Project area.

[159] Mr. Ryckman testified concerning NRSI's findings with respect to the SAR:

- NRSI conducted targeted surveys for Barn Swallow at culverts and bridges, identified 10 potential habitat locations and confirmed through visual inspection that there were no Barn Swallow nests in any of these locations;
- NRSI identified five potential habitat locations for Eastern Meadowlark and spotted one beyond the Project area during the field investigation but found no evidence of breeding within the Project area;
- NRSI submitted a Notice of Activity in relation to Barn Swallow and Eastern Meadowlark to the Minister of Natural Resources and Forestry ("Minister") under O. Reg. 242/08 as a precautionary measure and included these species in the OMP;
- NRSI identified five potential habitat locations for Bobolink and confirmed their presence in two of those habitats;
- NRSI submitted a Notice of Activity in relation to Bobolink to the Minister and prepared a habitat management plan in accordance with O. Reg. 242/08; mitigation measures include a commitment to convert an area of land in the vicinity of the Project area, which is 1.4 times greater than the Bobolink habitat that will be removed as a result of the Project, into a new or enhanced Bobolink habitat, as well as avoidance of construction activities in the Bobolink habitats during the breeding season.

[160] In response to a concern raised by Mr. Thomas, Mr. Ryckman stated that NRSI conducted extensive bat acoustic monitoring in the vicinity of the Project and considered migratory bat species and the fall migration period. He said NRSI's survey work was completed in 2017 in a variety of locations within the Project area and included three different types of acoustic monitoring, one of which involved full season monitoring from the beginning of May to the end of September, from sunset to sunrise. Mr. Ryckman noted that the fall migration period for bats primarily takes place in August and into early

September. He testified that NRSI submitted a Notice of Activity to the Minister and included protective measures with respect to SAR bats in the OMP.

Dr. Paul Kerlinger

[161] Dr. Kerlinger, who has a Ph.D. and experience in bird behaviour, ecology and research design, was qualified to provide opinion evidence as an expert on birds and the effects of wind energy projects on birds. He testified that, in his opinion, the Approval Holder adequately assessed the risks of the Project to birds. Dr. Kerlinger stated that he had reviewed NRSI's EEMP and OMP for the Project and found both to be rigorous plans. In his opinion, the EEMP's mortality thresholds, post-construction mortality monitoring methods, post-construction mitigation and mortality monitoring reporting are appropriate and protective. Dr. Kerlinger also noted that the OMP addresses SAR, particularly Bobolink, Eastern Meadowlark and Barn Swallow, and provides mitigation measures respecting these species.

[162] Dr. Kerlinger said that he discussed the records review and habitat assessments conducted for Bobolink, Eastern Meadowlark and Barn Swallow with Mr. Ryckman, noting that NRSI identified 10 potential Barn Swallow habitats in the Project area but confirmed through visual inspection that no nests were present and did not identify any Eastern Meadowlark habitat. He further noted that while NRSI identified two Bobolink habitats, the Approval Holder plans to implement mitigation measures to minimize the impact on Bobolink habitat during construction and will follow the procedure for Bobolink habitat under O. Reg. 242/08. Dr. Kerlinger testified that the Approval Holder has committed to creating a new Bobolink habitat or enhancing an existing one in the vicinity of the Project area, which will be equal to or larger than the area of habitat that will be damaged or destroyed, and he expects that this habitat addition or enhancement may lead to a net increase in the Bobolink population, because the habitat will be larger in size and will be managed.

[163] Dr. Kerlinger addressed the literature cited by Mr. Thomas, noting that the risk to birds from wind energy projects is quite low. He referred to the following two recent publications, which he described as well-respected: “Canadian estimate of bird mortality due to collisions and direct habitat loss associated with wind turbine developments”, Zimmerling et al., 2013, *Avian Conservation and Ecology*, 8(2): 10; and “Wind energy bird and bat monitoring database summary of the findings from post-construction monitoring reports”, Bird Studies Canada et al., July 2016. Dr. Kerlinger stated that these studies together constitute the largest and most rigorous bird fatality analysis conducted, involving approximately 150 wind farms in Canada and the US, and consistently show annual mortality rates of less than 10 birds per turbine. He further stated that the studies cited by Mr. Thomas that suggest higher fatality rates have significant methodological problems and are not considered authoritative or reliable.

[164] In response to Mr. Thomas’ evidence concerning migratory waterfowl, Dr. Kerlinger cited several studies to show that post-construction mortality rates for migratory waterfowl are very low. Regarding Mr. Thomas’ photograph of Snow Geese in proximity to the proposed location of a Project turbine, Dr. Kerlinger stated that there have been no reports of Snow Geese fatalities in the post-construction mortality reporting for 36 wind farms studies in Ontario over a period of 86 project years, and that Snow Geese fatalities tend to be quite low because they fly up to 2,500 feet in the air, well above the height of the turbines.

Dr. Scott Reynolds

[165] Dr. Reynolds, who has a Ph.D. and experience in the ecology and conservation biology of bats, was qualified to provide opinion evidence as an expert on bats and the impacts of wind energy on bats. He indicated that NRSI conducted an acoustical monitoring survey in the vicinity of the Project area in 2017 during the bat active season (from the beginning of May until the end of September) from sunrise to sunset for approximately 150 consecutive nights. Dr. Reynolds noted that: the survey was conducted at eight monitoring stations in a variety of habitats including monitoring

stations on two meteorological evaluation (“MET”) towers in an open field, similar to the proposed location of the turbines. He stated that, at each monitoring station, equipment was set up to hear the ultrasonic calls of bats as they travel the landscape.

[166] Dr. Reynolds testified that this survey concluded that the level of bat presence and activity in the Project site is relatively low overall, dominated by non-SAR Big Brown Bats and Hoary Bats, and is particularly low for SAR bats, which represented about 1% of all bat activity on site. He said he found this result to be consistent with the characteristics of the Project site, which is primarily agricultural, consisting largely of open fields that are not a preferred roosting or foraging habitat for bats. Dr. Reynolds cited research studies to support that proposition, stating that bats do not cross open habitats often, preferring to fly along corridors that are not open, and forage by water. He provided his opinion that the Project site does not contain a unique or critical habitat for bats.

[167] Dr. Reynolds stated that additional short-term two-week surveys were conducted from sunset to sunrise at potential roosting or foraging habitats (i.e., woodland edges and open water), survey sites chosen to increase the diversity of habitats being sampled and to identify habitat likely to have higher levels of bat activity. He further stated that the results of these surveys revealed higher overall levels of bat activity, as expected, with SAR bats representing approximately 5% of bat activity. Dr. Reynolds noted that, in comparison, the surveys at the MET tower stations showed generally low bat activity, particularly for SAR bats, for monitors placed at ground level. He added that, for the MET tower monitors placed at higher altitudes of 29 m and 46 m off the ground, there was almost no SAR bat activity. Dr. Reynolds testified that SAR bats represented 2% of activity at the higher altitudes and only 0.08% of bat activity at the 46 m altitude, noting that there is a non-linear exponential decline in bat activity at higher altitudes. In his opinion, it is even less likely that there will be SAR bat activity at the higher elevation of the turbine blade sweep area, the bottom of which is at least 14 m taller than the 46 m MET tower monitoring stations. He also stated that there is

unlikely to be any regular presence of any SAR bat species other than the Little Brown Bat.

[168] Dr. Reynolds provided clarification on the monitoring technology used to survey bats, explaining that a microphone is used to record the ultrasonic calls of different bats, which is then classified using software, and that each species of bat has a unique call structure that is recognized by the software through comparison to a library of information. While acknowledging that there is some room for error in the software's classification due to potential changes in call structure if sampling a non-characteristic habitat, such as a more cluttered habitat, he noted that these surveys currently provide the most accurate perception of bat use of the landscape that is possible to be collected. Dr. Reynolds also pointed out that NRSI manually reviewed each recording, providing a higher level of accuracy in the results.

[169] Regarding the 2008 Baerwald study on barotrauma cited by Mr. Thomas, Dr. Reynolds referred to three additional studies, two of which were published more recently in 2011 and 2012, which indicate that initial estimates of barotrauma were highly inaccurate and that barotrauma does not seem to be a significant source of mortality at wind energy sites.

[170] Dr. Reynolds commented on the conditions in the REA, particularly Condition Q1, which provides that activities requiring authorization under the *ESA* will not commence until the necessary authorizations are in place. He stated that, under s. 23.20 of O. Reg. 242/08, the Approval Holder has an obligation to prepare a mitigation plan in respect of SAR bats and to take operational mitigation steps to minimize any adverse effects of the Project on SAR bats. Dr. Reynolds said he had reviewed the OMP submitted to the MNRF on behalf of the Approval Holder and stated that the OMP included the following measures to ensure the protection of SAR bats: strong curtailment measures that have proven to significantly reduce the risk of bat mortalities; increased post-construction monitoring; development of a technical advisory committee ("TAC") to review and modify the plan if needed; and, in the event of a SAR bat

mortality, prompt notification of and consultation with the MNRF and TAC to evaluate and ensure the adequacy of the mitigation measures.

[171] Comparing the Project to the Amherst Island wind project, Dr. Reynolds stated that both are located in similar predominantly agricultural landscapes with turbines in open fields, and provided his opinion that the OMP prepared by the Approval Holder is more precautionary than the OMP at Amherst Island, and that the Project represents an even lower risk to bats than the Amherst Island wind project. He further opined that the mortality risk to SAR bats at the Project is low even before consideration of the OMP due to: the landscape and habitat at the Project, which is predominantly agricultural field; and the acoustic monitoring results and ecology of the SAR bats, given that the Little Brown Bat usually flies low to the ground. Dr. Reynolds testified that this low mortality risk is even lower taking the OMP measures into account, provided his opinion that there is unlikely to be SAR mortality at the Project.

Discussion, Analysis and Findings on Issue 2

Submissions

Appellant's Submissions

[172] The Appellant reviews the evidence of Mr. Thomas, noting his observation that collision risks have not been adequately considered in the proposal, especially for an area with extremely high numbers of spring/fall migratory waterfowl and songbirds that use the area as a stopover/staging area. The Appellant asserts that if the monitoring period does not include the migration period, accurate results will not be available and wildlife species will be at risk, and further asserts that patterns of migration are changing. The Appellant submits that there are many more accurate and up-to-date websites and bird-monitoring groups to find more precise information about which bird species have been sighted, as well as where and when. The Appellant observes that looking at presumed habitat may not be the best way to determine whether there have

been recent local species sightings, and that input from someone intimately familiar with the local habitat is critical to good results, especially with a lower number of sightings for SAR species available due to diminished numbers.

[173] The Appellant contends that the risk of bat mortality was grossly underestimated in the Approval Holder's studies and that every effort must be made to identify and protect them and their habitat because fatalities from wind turbines could impact the population viability of migratory bats, such as the Hoary Bat. The Appellant submits that the results of bat monitoring studies in the Project area have not been published or made available for view on the Approval Holder's website and, with the exception of the four locations on MET towers, there is no indication of the exact location of the monitoring devices, to confirm whether they correlate to known bat habitat and sightings.

[174] The Appellant submits that the methods used to monitor and identify bats found in the Project area reflect serious problems with the acoustical bat monitoring programs, including identification of bat echolocation calls, as the acoustical bat monitoring tools are still awaiting sufficient validation before they can be used for accurate assessment, especially of the quieter, smaller, lighter and more vulnerable SAR bats like the Little Brown Bat. The Appellant further submits that thorough field tests should be carried out to assess the limitations and strengths of these tools before they can be used as the basis for appropriate management decisions.

Approval Holder's Submissions

[175] Regarding birds, the Approval Holder notes that the Appellant raises a concern as to whether risks of impacts to migratory waterfowl and songbirds were adequately considered, and that the Appellant submits there was a lack of monitoring of spring and fall migration events and a lack of knowledge or acknowledgment of waterfowl staging areas, in particular raising a concern with respect to Snow Geese. The Approval Holder asserts that the expert evidence of Mr. Ryckman and Dr. Kerlinger establishes that

migratory waterfowl, including Snow Geese, and songbirds were properly and adequately considered during the environmental assessment work for the Project, and that the risk of any impact to those species is low. The Approval Holder refers to Mr. Ryckman's evidence that NRSI's environmental assessment work considered waterfowl and songbirds, including the potential presence of stopover and staging habitat for migratory waterfowl (including Snow Geese), shorebirds and landbirds according to provincially established protocols.

[176] The Approval Holder further refers to Dr. Kerlinger's evidence that NRSI's investigations with respect to spring/fall migratory waterfowl and songbirds were appropriate and that the risk of harm to spring/fall migratory waterfowl and songbirds posed by the Project when operating in accordance with the REA is low. The Approval Holders notes, in particular, Dr. Kerlinger's opinion evidence that the collision risk for Snow Geese is extremely low, there has been no recorded Snow Goose fatality at any project, the risk of any Snow Geese mortality at this Project is extremely low and, in any event, the population of Snow Geese is robust. The Approval Holder also notes Dr. Kerlinger's evidence that the risk of any impact to songbirds is also low because the Project site does not represent good stopover habitat for them, they typically use large forests which are not present at this site, and the Project is well away from coastlines that tend to attract songbirds in significant numbers.

[177] The Approval Holder observes that the Appellant's case on birds amounts to merely questioning the sufficiency of the environmental assessment work conducted and raising concerns about potential risks. The Approval Holder submits that Appellant's questions were fully answered by the uncontradicted evidence of the only bird expert that testified.

[178] Regarding bats, the Approval Holder asserts that the Appellant questions the methodology or quality of the bat acoustic monitoring tools that were used in conducting the monitoring program, saying that the risk of mortality has been underestimated. The Approval Holder submits, however, that the uncontradicted evidence of the only bat

expert who testified was that these concerns are not valid. The Approval Holder reviews the evidence of Dr. Reynolds, submitting that his evidence establishes that: bat presence in the area is relatively low, and this is supported by factors that include the nature of the landscape habitat in the area and the pre-construction acoustic monitoring results; the mortality risk at this Project is low; and there are strong precautionary mitigation measures in place to ensure the protection of bats, including migratory bats and other species.

[179] The Approval Holder asserts that the Appellant's case on bats amounts merely to raising questions about the acoustical monitoring methodologies used and suggesting that mortality risk may therefore be underestimated. The Approval Holder further asserts that the Appellant's case does not even approach meeting its onus on the statutory test.

[180] The Approval Holder submits, therefore, that the Appellant has not met its onus of proving that this Project, operated in accordance with its REA, will cause serious and irreversible harm to birds or bats.

Director's Submissions

[181] The Director submits that the Appellant has not met its burden of proof with respect to its argument that the Project, if allowed to proceed, will cause serious and irreversible harm to birds and bats, noting that the evidence it tendered in support of this argument simply points out alleged shortcomings in the Approval Holder's NHA and that it did not tender any evidence explaining how or what harms to birds and bats will occur. The Director observes that the Appellant's only witness on this issue, Mr. Thomas, was qualified as having general expertise in wildlife biology but: his principle area of expertise is wildlife toxicology, not birds and bats; his experience with birds and bats is limited to studying how wind facilities might affect migration in Western Canada at ridgeline sites in the context of pre-construction assessment; and he has not conducted any research or studies on post-construction impacts of wind facilities on birds or bats.

[182] The Director further submits that Mr. Thomas suggested the Project may have an impact on migratory birds and bats but provided no specific information that the Tribunal could use to assess the veracity of his claims, because his evidence generally consisted of him indicating where in his opinion the Approval Holder had failed to properly assess the potential impacts to birds and bats. The Director notes that Mr. Thomas did not give any evidence as to the bird and bat populations in the vicinity of the Project other than Snow Geese, which he described as “exploding”, and that Mr. Thomas suggested that the acoustical monitoring conducted for bats was inadequate and the equipment used was not appropriate, but did not reference or take into account mitigation and curtailment measures that will be implemented if necessary.

[183] The Director asserts that the Tribunal has previously indicated that while alleged inadequacies in the surveys and assessments submitted by the Approval Holder in support of its application for the REA may be relevant information, it is insufficient on its own to meet the statutory test of whether engaging in the Project in accordance with the REA will result in serious and irreversible harm. The Director submits that, since this is the only type of evidence that the Appellant has tendered, the Appellant has failed to discharge its onus. The Director also notes that at least one of the journal articles tendered by Mr. Thomas, which addresses the impacts of wind turbines on bird species, supports the position that wind turbines do not cause serious and irreversible harm.

[184] The Director reviews the evidence provided by the Approval Holder’s three opinion witnesses and submits that it not only demonstrates that the Project will not cause serious and irreversible harm to wildlife, but further demonstrates that the Project is unlikely to cause any significant harm at all. The Director further submits that the evidence tendered by the Approval Holder through its witnesses addressed all the concerns raised by Mr. Thomas and that, even if Mr. Thomas’ concerns about the NHA were substantiated, he did not provide any evidence of how specific species would be impacted in a serious and irreversible manner, or as to how the mitigation and curtailment measures proposed by the Approval Holder are insufficient.

[185] The Director asserts that the Appellant bears the onus of demonstrating that engaging in the Project in accordance with the REA will cause serious and irreversible harm to birds and bats and, based on the evidence outlined above, that the Appellant has failed to discharge its onus and, therefore, its appeal with respect to wildlife must also be dismissed.

Analysis and Findings

[186] The legal test that the Appellant must meet in respect of the wildlife-related issues raised ("Environment Test") is found at s. 145.2.1(2)(b) and (3) of the *EPA*: it has the onus of proving that engaging in the renewable energy project in accordance with the REA will cause serious and irreversible harm to plant life, animal life or the natural environment. In *Lewis v. Ontario (Ministry of the Environment)*, [2013] O.E.R.T.D. No. 70, at para. 8 and 9, the Tribunal summarized some of aspects of the Environment Test as interpreted in previous decisions, including the following: an appellant is required to show such harm on the civil standard of a balance of probabilities; evidence that only raises the potential for harm does not meet the onus of proof; and the word "serious", and the phrase "serious and irreversible", must be interpreted on a case-by-case assessment according to all relevant factors.

[187] Mr. Thomas, the Appellant's only expert witness on this issue, was qualified to provide opinion evidence on wildlife biology and water toxicology. He raised specific issues concerning potential impacts on birds and bats. Regarding birds, Mr. Thomas acknowledged that if the Project is not located near a sensitive or important bird habitat, there will be a relatively low risk to birds. However, he raised questions regarding the NHA bird studies conducted, particularly with respect to timing and level of detail. He highlighted specific species, including Snow Geese and SAR such as Barn Swallow, Eastern Meadowlark and Bobolink.

[188] Responding to these concerns, Mr. Ryckman provided information about the studies on waterfowl and songbirds, including the potential presence of stopover and staging habitat for migratory waterfowl (including Snow Geese), shorebirds and landbirds, and specifically addressed the studies on the SAR birds. Dr. Kerlinger, an expert on birds and the effects of wind energy projects on birds, also responded with his opinion evidence that: the Approval Holder had adequately assessed the Project's risks to birds and had produced a rigorous EEMP and OMP, including mitigation measures for SAR birds; and the risk of any Snow Geese mortality at this Project is extremely low.

[189] Based on this evidence, the Tribunal is satisfied that Mr. Thomas' concerns about birds have been addressed by Mr. Ryckman's opinion evidence that adequate studies of birds were conducted, as well as Dr. Kerlinger's opinion evidence concerning mitigation measures for birds. On the basis of their extensive experience with birds in the context of wind energy projects, the Tribunal prefers the opinion evidence of Mr. Ryckman and Dr. Kerlinger on these issues. Based on their evidence, the Tribunal finds that the monitoring and mitigation measures in the EEMP, OMP and Condition P of the REA will be sufficient to protect the bird species in the Project area. The Tribunal finds that the Appellant has not met its onus of proving that engaging in the renewable energy project in accordance with the REA will cause serious and irreversible harm to any birds.

[190] With respect to bats, Mr. Thomas gave evidence that the risk of bat mortality resulting from the Project was underestimated and furthermore that bats would be susceptible to barotrauma as a result of the Project. In response, Mr. Ryckman provided details of the bat acoustic monitoring in the vicinity of the Project and Dr. Reynolds, an expert on bats and the impacts of wind energy on bats, testified that the survey revealed a level of bat presence and activity in the Project site that is relatively low overall, and particularly low for SAR bats, which represented about 1% of all bat activity on site. Given that there was almost no SAR bat activity at the MET tower monitors placed at 29 m and 46 m off the ground, Dr. Reynolds provided his opinion that SAR bat activity is even less likely at the higher elevation of the turbine blade sweep area, and also that

barotrauma does not appear to be a significant source of mortality at wind energy sites, contrary to initial studies on this issue. The Tribunal accepts Dr. Reynold's opinion evidence on these matters, noting his extensive experience in the study of bats and wind turbines.

[191] On the basis of the testimony of Dr. Reynolds and Mr. Ryckman, the Tribunal is satisfied that the requirements under REA Condition Q1 and s. 23.20 of O. Reg. 242/08, that the Approval Holder prepare a mitigation plan and take operational mitigation steps to minimize any adverse effects of the Project on SAR bats, include curtailment measures shown to significantly reduce the risk of bat mortalities. The Tribunal finds, based on their evidence, that the proposed monitoring and mitigation measures in the OMP, EEMP and REA Conditions P and Q will reduce the low risk to bats, including SAR bats, from the Project.

[192] The Tribunal finds that the concerns raised by Mr. Thomas have been addressed, and the Appellant has not met its onus of proving that engaging in the renewable energy project in accordance with the REA will cause serious and irreversible harm to bats.

[193] In conclusion, therefore, the Tribunal finds the Appellant has not proven that engaging in the renewable energy project in accordance with the REA will cause serious and irreversible harm to plant life, animal life or the natural environment.

Issue 3: Whether engaging in the Project in accordance with the REA will cause serious harm to human health and/or serious and irreversible harm to plant life, animal life or the natural environment, specifically with respect to groundwater

Evidence

Evidence of the Appellant

[194] The Appellant called Ian Reveler and Julie Cyr as fact witnesses in respect of the groundwater issue. The Appellant called Santo Giorno and Donald Munro as technical witnesses, and also called Angelique Magee, who was qualified to provide both technical and expert opinion evidence.

Santo Giorno

[195] Mr. Giorno was qualified as a technical witness with experience and knowledge in understanding and analyzing scientific data and technical reports. He has an undergraduate degree in applied chemistry and his professional experience includes working in quality control, quality assurance and technology development for a steel manufacturer and a beverage corporation. Mr. Giorno testified concerning the experience of the East Lake St. Clair Wind and North Kent Wind 1 (“North Kent 1”) projects in the Municipality of Chatham-Kent, providing a chronology and describing the 16 well water complaints submitted by area residents during the period of pile driving activity, as well as four well interference reports submitted during the North Kent 1 project’s operational period. He stated that these complaints were investigated by North Kent 1 consultants, AECOM Canada and Golder Associates.

[196] In particular, Mr. Giorno gave evidence about two incidents that occurred during the pile driving stage and one in the operations stage, involving problems with water quality, turbidity and reduced flow. Regarding one of these incidents, he stated that while AECOM Canada concluded that any damage was not as a result of foundation construction or pile driving, an independent analysis found that a post-pile driving water

sample represented an increase by a factor of 82 times in total suspended particles and an increase by a factor of over 14,500 times in black shale particles, compared to pre-construction levels. With respect to another incident, Mr. Giorno testified that the MECP claimed that spikes in turbidity levels in area groundwater were observed days before and weeks after pile driving, but that his own analysis indicated that the post-construction spikes in turbidity level are much more pronounced. However, he acknowledged on cross-examination that all of the AECOM Canada investigations into the complaints relating to the North Kent 1 project reached the same conclusion that groundwater quality and supply issues were not a result of the North Kent 1 project foundation construction or pile driving activities.

[197] In response to Shawn Kinney's evidence at the Hearing, discussed below, that groundwater in Chatham-Kent was known for low yield and poor water quality prior to the North Kent 1 project, Mr. Giorno stated that the relative yield and quality of the groundwater did not prevent the use of more than 200 domestic wells prior to the construction of the wind farm. He further stated that the difference in geology of the Kettle Point bedrock and the bedrock surrounding the Project may have an impact on the composition of any contaminants, but would not make wells immune to contamination. Regarding the Approval Holder's evidence provided by a panel consisting of Dr. Kent Novakowski, Dr. Storer Boone and Brian Byerley ("Panel"), Mr. Giorno noted discrepancies as to whether the Approval Holder would or would not use H-piles or driven piles for the Project's turbine foundations.

Donald Munro

[198] Mr. Munro was qualified as a technical witness with experience and knowledge in water quality, groundwater analysis and contamination, and well-water construction and well-water treatment equipment. He expressed concern regarding potential impacts on potable water sources in the region surrounding the Project site, stating that the Hydrogeological Assessment Report: states that no turbines will be located in municipal well head protection areas ("WHPAs") but does not provide a mapping overlay to

confirm this assertion; and fails to discuss the location of turbines in relation to the Vars-Winchester and Crysler-Finch eskers. Emphasizing the importance of this layer of gravel and sandy soil as a filtration zone, Mr. Munro testified that six local municipalities derive their water from these eskers adjacent to the Project site and that gravel and sand eskers are recharge areas for the contact zone above the bedrock and below the overburden soils. He noted his concerns that: if gravel and sandy soils are removed to accommodate the turbine bases, contamination may find its way into the bedrock wells; many owners use overburden wells as their source of drinking water; and the reported figure of 666 active wells in the Project area is inaccurate and the actual number of wells exceeds 800.

[199] With respect to the installation of piles, Mr. Munro gave evidence that the Approval Holder has provided minimal information regarding the type of piles, the method of installation, the use of vibratory equipment and the potential for creating pathways for contaminants to enter the groundwater regime. He said that the installation of piles could cause an upwelling of unwanted contaminants, such as salt and sulphur, into the nearby eskers because piles could penetrate the bedrock by up to 1.5 m. Mr. Munro acknowledged, under cross-examination, that there were a number of causes that could contribute to contamination of a residential well, including the well casing, the annular seal on the well itself, the well screen clogging up, and problems with the plumbing itself, the hot water tank, the pressure tanks, the treatment equipment, sediment stirred up by the pump and fluctuations in well water levels. He recommended that monitoring should be conducted by an independent qualified groundwater professional to provide reports to the MECP, stating that monitoring is a key component of any mitigation measures and it is imperative that this function be fulfilled by an independent party rather than a consultant contracted by the Approval Holder.

Ian Reveler

[200] Mr. Reveler stated that karst features are present in the Project area, providing sketches and photographs as evidence of: a cave formation measured at 15.3 m in length along Concession 11 & 12 Road within the 120 m of the Project boundary; the Paquette McMahon Municipal Drain, which submerges underground; and deep fissures and bedrock fractures measured between 1.85 m and 2.23 m in depth.

Julie Cyr

[201] Ms. Cyr testified that her tap water ran brown on June 2 and 3, 2018 after observing a well driller working at the site of turbine 43, approximately 1.3 km from her home, on May 31, 2018. She stated that she visited the MECP office in Ottawa with a water sample and was advised to contact the Cornwall MECP Office. Ms. Cyr provided a chronology of her interactions with Melissa Forget of the Cornwall office, who gathered well water samples on June 8, 2018, and contacted Ms. Cyr on June 19, 2018 to ask if she could take more samples and to advise that she had received a number of complaints of well water problems in the area. Ms. Cyr said she granted Ms. Forget access to do more sampling, but the water discolouration had cleared up by that time. Ms. Cyr stated that she is concerned about water quality because the test borehole drilling is only a fraction of what will occur if the Project moves forward. She was presented with the results of her Water Wells Pollution Incident Report during her testimony.

Angelique Magee

[202] Ms. Magee, an environmental scientist with the federal government, was qualified as a professional geoscientist to provide expert opinion evidence as an environmental scientist specializing in multidisciplinary science integration in environmental assessment, and as a technical witness to provide technical evidence based on her knowledge and experiences in groundwater contamination and geological

analysis (see Appendix 1 for the Tribunal's reasons for qualifying her in this manner). She addressed the potential for landslide hazards, seismicity, flooding and groundwater and well water contamination. Ms. Magee testified that the Approval Holder did not adequately address landslide hazard due to Leda clay and potential contamination of groundwater and well water, and the MECP failed to adequately address those issues in the REA. She stated that the proposed conditions in the REA are not sufficiently protective and the only suitable mitigation would be to remove the proposed turbines that are underlain by Leda clay or highly vulnerable aquifers. Ms. Magee raised concerns about the potential for construction, operation and decommissioning activities to induce a retrogressive landslide.

[203] Ms. Magee gave evidence that the Project area is underlain by glaciomarine and prodelta silt and clay sediments that collectively form the Champlain Sea Deposits, known as Leda clay. She described Leda clay as a water-saturated gel, which in solid form is a highly-sensitive clay with a tendency to change from a relatively stiff condition to a liquid mass when it is disturbed, a process known as spontaneous liquefaction. Ms. Magee stated that when a mass of Leda clay is subject to sufficient stress, the material's behaviour transitions from that of a particulate or solid into that of a liquid, causing a retrogressive landslide. She testified that the following factors may lead to the liquefaction of Leda clay: river erosion of the toe of the slope of the Leda clay unit; elevated pore pressures in Leda clays associated with the rapid drawdown of the water table during spring runoff; vibrations caused by nearby construction activity; and seismic shaking. Ms. Magee further stated that retrogressive landslides tend to occur suddenly and without warning, typically in areas with very low sloping terrain, and the only way to ascertain the presence and depth of Leda clay is through a combination of geotechnical and seismic surveys.

[204] Ms. Magee testified that there have been more than 250 mapped landslides attributed to Leda clay in Canada, including several in Eastern Ontario and the Eastern Townships of Quebec, and provided the following two examples of major landslides that led to the relocation of entire towns: in 1991 the Government of Ontario chose to

relocate Lemieux, Ontario due to the risk of retrogressive landslide and in 1993, a major landslide occurred in the former location of Lemieux causing significant loss of land along the South Nation River but no loss of life; and in 1971 in Saint-Jean-Vianney, Quebec, a retrogressive landslide led to significant loss of life, with 31 deaths and 40 homes destroyed, and Saint-Jean-Vianney was subsequently relocated due to the presence of Leda clay. Ms. Magee also referred to a blanket peat landslide in Ireland in 2003, resulting from the construction of a wind farm, which travelled 20 km and severely polluted a lake, affecting a nearby town's water supply and killing more than 50% of the fish population.

[205] Regarding the landslide susceptibility of the Project site, Ms. Magee referred to a map of landslide susceptibility excerpted from a 2012 study, which she said denoted the highest level of landslide susceptibility at the Project site and surrounding region. She stated that a landslide hazard assessment and baseline studies, assessing the geotechnical properties of Leda clay at the turbine sites, are necessary to assess the potential impacts of the Project, and further stated that the results should be reviewed by the MECP's geotechnical experts. Ms. Magee recommended that the information arising from such assessments be provided to the public to ensure that members of the public are fully informed about the risks of the Project.

[206] With respect to the history of earthquake activity and flooding in the Ottawa Valley region, Ms. Magee testified that the Western Seismic Zone has had numerous small earthquakes and has the potential to experience earthquakes up to a magnitude of 6.2 on the Richter scale. She stated that seismic shaking is felt more intensely in areas with Leda clay and can lead to landslides, and further stated that North Stormont experienced catastrophic flooding in 2017 as a result of a rapid spring freshet and intense rainstorms. Ms. Magee expressed concern that the Project could exacerbate flooding, noting that wind turbine construction can lead to an increase in flooding or a diminished capacity of the area surrounding the turbine to absorb run-off and groundwater level changes. She said that the Approval Holder should: evaluate the potential effects of natural disasters such as earthquakes, landslides and flooding on

the Project; conduct a risk assessment identifying the environmental effects of the worst-case scenarios; and make this information available to the public.

[207] Regarding groundwater and well water, Ms. Magee outlined the local hydrogeological context, stating that: the Project area has several deep and shallow aquifers; water quality improves with depth because water quality in the upper shallow aquifers is not good due to the presence of silts, salt beds and shales; and the deep aquifers, which are protected from surface water interactions by depth, provide high quality water and are used by residents for their well water supply. She testified that there would be a high risk of contamination of the aquifers as a result of pile driving, construction and use of explosives in the Project area, and that these activities may also contaminate shallow highly vulnerable aquifers in the region that are used as potable water sources by the public and municipalities. Ms. Magee noted the example of Chatham-Kent as an area whose water supply was contaminated following pile driving for wind turbine construction. She stated that, once fracturing opens up conduits between shallow and deeper groundwater aquifers, it cannot be reversed and mitigation is not possible except through filtration, which may not be effective if the concentration of sediment is too high.

[208] Ms. Magee noted that the Project area is characterized by a sensitive groundwater regime because silt clay units allow very slow infiltration of surface water, protecting the deeper aquifers from contamination but also leading to a higher proportion of runoff water. She stated that, therefore, during the summer months, the recharge of the groundwater table is impacted due to water taking that exceeds recharge rates. Ms. Magee further testified that most wells in the region take water from a shallow, highly vulnerable aquifer at the contact zone between the overburden that slowly filters groundwater and the limestone bedrock. She stated that, because the Approval Holder will need to drill or blast through this aquifer to install piles on the bedrock below, there is a high probability that the aquifer will become contaminated.

[209] Ms. Magee described the layers below the silt and clay, noting that: the Ottawa and St. Martin Groups are not used for wells or potable water due to poor water quality; the Oxford, March and Nepean Formations are highly valued, produce good quality water and are used for wells or potable water; and the Grenville series acts as an aquitard in the region, characterized by very low permeability, and is not productive for well water use. She stated that poor water quality from the upper sediments can impact the deeper aquifers if cross-contamination is induced by vibration, pile driving, blasting and fracturing of units is caused by wind turbine construction. Ms. Magee further stated that should contamination occur, Condition I8 of the REA only requires the Approval Holder to provide an adequate supply of potable water to well owners based on the opinion of the qualified expert identified in Condition I6. She noted that the MECP has left this issue in the hands of the Approval Holder and that, in the case of Chatham-Kent, the proponent claimed the contamination was not due to wind turbine construction and is not providing water.

[210] Regarding karst topography, Ms. Magee testified that it is highly sensitive and known to open conduits for groundwater flow at faster rates than in surrounding aquifer units. She said that karst units are susceptible to damage from vibration and construction, such as soil collapses due to disruption of underground caverns. Ms. Magee referred to a map, which she said showed that Project turbines are proposed to be situated on inferred or potential karst units. She further noted that local field observations by North Stormont residents support the map data and indicate that, in the western portion of the Project area, karst features such as sinkholes, soil lined depressions and larger cave formations, are visible at the surface.

Evidence of Presenters and Participant

Karine Walkey Skinner

[211] Ms. Walkey Skinner raised the issue that exposure to contaminated groundwater, and the concern over the impact of contaminated water, will cause serious harm to the

mental and physical well-being of residents. Ms. Walkey Skinner stated that the Project may impact the quality of well water and asserted, based on her research, that there is already an account of cloudy well water in North Stormont resulting from recent turbine testing.

James Winters

[212] Mr. Winters raised the issue of water contamination, stating that both humans and cattle need access to clean potable water and noting that clean drinking water is of the utmost importance to the health of his cattle and to his dairy operation, which has approximately 90 milk cows and 100 head of young stock. He testified that distressed cows produce less milk and even if water quantity remains adequate, cows will refuse to drink distasteful or turbid water beyond the amount they require to survive, affecting the calves and young stock. Mr. Winters said that, if his water supply is affected, he would have a significant increase in costs related to hauling water and sourcing new water. He stated that any water quality issues would directly affect the viability of his dairy operation and lead to human stress, adding that high stress levels can lead to mental and physical health issues.

Ruby Mekker

[213] Ms. Mekker testified that the Project is proposed to be located in the Western Quebec Seismic Zone, which constitutes a vast territory enclosing the Ottawa Valley from Montreal to Témiscaming, as well as the Laurentians and Eastern Ontario, and in which an earthquake occurs every five days on average, according to the Natural Resources Canada website. She noted that in June 2010 there was a recorded earthquake in the region that was of a magnitude of 5.0 on the Richter scale and, in November 2015, an earthquake was measured at a magnitude of 3.3. Ms. Mekker said she is concerned about what might occur to heavy turbines that are 132m tall and have blade lengths of 71m in the event of another earthquake or with respect to triggering an earthquake. She stated that, if an earthquake occurred and caused any of the turbines

to fall, this could cause serious harm to human and animal health. Ms. Mekker further stated that the turbine construction might involve pile driving and compacting, which may impact the frequency and intensity of earthquakes in the region.

[214] Ms. Mekker said that the well on her family dairy farm, now owned by her son, was drilled in June 1984 and has continued to be a dependable source of potable water, providing a supply of 60 or more gallons per minute. She noted that this water source has always been able to support the dairy farm, which currently stands at over 200 head of cattle. Ms. Mekker stated that the North Stormont region is home to two important eskers. She said she is concerned about the impacts from the Project, such as contamination, on these water sources, due to vibration or another cause that is not yet confirmed. Ms. Mekker raised the K2 Wind Project as an example of a wind project that disturbed an aquifer, which was systematically drained and formed a lake colloquially referred to as "Lake K2", according to the Ontario Wind Resistance website.

[215] As noted above, Ms. Mekker also provided evidence on behalf of her son, Anthony Mekker. Like his mother, Mr. Mekker is concerned about the impact of the Project on the quality and quantity of well water in relation to the health of humans and animals.

[216] Ms. Mekker stated that, since taking over the farm, Mr. Mekker has increased the size of the milking herd and young stock, and he credits the clean and plentiful water from the well with ensuring a high quality and quantity of milk. Ms. Mekker said Mr. Mekker is concerned that this water source will be compromised and lead to an increase in expenses and a reduction of income. She said that Mr. Mekker emphasizes the stress involved for dairy farmers when their cows do not produce any milk, or only produce milk of poor quality. Ms. Mekker stated that Mr. Mekker is worried about how the broader community will be able to obtain water since the Vars-Winchester Esker supplies water to multiple towns and private wells.

Rainer Pethke

[217] With respect to groundwater, Mr. Pethke said the construction and operation of the Project may cause water contamination due to chemical pollutants or to the release of contaminants underground within the limestone bedrock. He noted that his well was drilled in 1979 and has been a consistent source of clean, potable water even in drought conditions for many years. Mr. Pethke emphasized that access to clean potable water is a necessity of life for humans and animals, noting that animals could refuse to drink poor quality water and then become ill and die. Further, he testified that water supply issues would affect the livelihood of the community as well as his own livelihood, causing him and his family extreme stress, which he said is known to be a health impact.

Cynthia Daoust and Trenant Acres Ltd.

[218] Ms. Daoust testified on her own behalf and on behalf of her family's dairy farm, Trenant Acres Ltd. She expressed concern about the impact of the Project on groundwater, as her dairy farm and family residence are located directly on part of a highly vulnerable aquifer. Ms. Daoust stated that her concerns are based partly on past water problems in Walkerton, as well as recent problems in the Chatham-Kent area in relation to the construction of a wind turbine project. She said she has been able to rely on her current well for over 35 years, even in drought conditions, and is concerned about the impacts of test drilling, and constructing and operating large turbines.

[219] Ms. Daoust stated that the economic viability of her business is directly linked to the availability of constant volumes of potable water. She noted that her dairy operation has approximately 108 head of dairy cattle, which drink an average of 120 litres ("L") of water per day in addition to other water usage for the operation, therefore requiring a minimum of 8,424 L of water per day. Ms. Daoust testified that when water is limited or not flowing at a sufficient rate, as when there are particulates in the water system, cattle reduce their nutritional intake leading to decreased milk production, less ability to

become pregnant and nervous behaviours. She further testified that in these circumstances the cows' offspring would have reduced growth rates, take longer to become reproductively viable and develop unusual behaviours resulting in other health issues.

[220] Ms. Daoust stated that, due to these groundwater issues, concern and stress about the economic survival of their business will affect her family's health. She noted that their farm is not close to any village to access water, and that water restrictions due to volume or quality would affect the health of animals and humans. Ms. Daoust further noted that she is concerned about compensation if there are water quality issues and what kind of action will be taken in the event of a water shortage.

[221] Ms. Daoust testified that she found sediment in her water on June 11, 2018, when the water looked like a scoop of dirt had been added to it. She noted that she had contacted the MECP and a representative was sent to her property the next week. Ms. Daoust said she is worried that, after only a drilling test and on a property outside of the identified "norm of concern", she has already found sediment and particulates in her water. She stated that her priority is to ensure that her water source continues to be viable, and she wants to know that she will be compensated for any future water quality problems if the Project moves forward.

Evidence of the Approval Holder

[222] The Approval Holder called a panel of three expert witnesses in relation to the groundwater issue: Dr. Novakowski, Mr. Byerley and Dr. Boone. Mr. Little also answered a question of the Tribunal as a fact witness regarding this issue.

Dr. Kent Novakowski, Brian Byerley and Dr. Storer Boone

[223] The Panel jointly provided opinion evidence, each speaking to his respective area of expertise, regarding the impact of the Project on groundwater. The members of

the Panel were qualified to provide opinion evidence as follows: Dr. Novakowski as a hydrogeologist with expertise in fractured rock; Dr. Boone as a geotechnical engineer with expertise in foundation engineering, including in soft sensitive clay, and on wind energy projects, groundwater control for dewatering, measurement of ground vibrations, and slope stability; and Mr. Byerley as a hydrogeologist with expertise in source water protection, construction dewatering and rural servicing (water wells and septic systems). The Panel noted that several geotechnical and hydrogeological field investigations have been completed on behalf of the Approval Holder to characterize the subsurface and related conditions in the Project area, including: hydrogeological assessment and effects assessment; a preliminary geotechnical report; preliminary slope stability assessment; and geotechnical field investigations at each turbine location.

[224] With respect to potable water wells in the Project area, the Panel responded to various statements made by Mr. Munro and Ms. Magee. The Panel disagreed with Mr. Munro's statement that there may be over 800 active wells in the vicinity of the Project, stating that there are no active drinking water wells within the Project location, within 200 m of any Project turbines or within 500 m of any of the deep foundations used for the Project. Regarding Ms. Magee's statement that the Project is located in an area where there is a potential to affect municipal water supplies, the Panel responded that the Project location is entirely outside of any WHPAs and has no potential to affect municipal water supplies. Regarding the concern expressed by some of the witnesses that nearby eskers may be impacted by the Project, the Panel noted that an assessment report and geotechnical investigations indicate that, of the three turbines that are located close to the mapped eskers, only one may be situated on sand overburden that has the potential to be related to an esker. The Panel emphasized, however, that this turbine is located outside of any WHPAs, is more than 200 m away from any active wells, and is not expected to have any impacts on water supply wells that may be constructed in esker deposits.

[225] The Panel noted contradictions in the Appellant's evidence on the depth and design of water wells in the Project area, stating that Mr. Munro asserted that the majority of wells are sourced near the contact zone between the bedrock and surficial deposits, while Ms. Magee described the water quality as poor in the upper stratigraphic units and stated that deeper aquifers are used by most residents. The Panel testified, based on information in the publicly-accessible Water Well Database, that of the private water supply wells used for domestic or farming purposes within 1 km of the Project site: the median depth to bedrock is approximately 5 m; the median depth to "water found" is approximately 18 m; and the median total well depth is approximately 23 m. The Panel further testified that, as such, most wells within 1 km of the Project site obtain their water from the upper bedrock, below the level of the contact zone aquifer.

[226] With respect to subsurface conditions, the Panel provided evidence on the unconsolidated stratigraphy (i.e., rock layers), bedrock and hydrogeology of the Project area in response to what they said were inaccurate descriptions in the Appellant's evidence. The Panel stated that unconsolidated stratigraphy in the Project area is characterized by four predominant glacially-derived materials: off-shore marine silt and clay; glacial till; organic soils; and near soil sediments. The Panel further stated that off-shore marine silt and clay, also known as Leda clay, is generally of low permeability and, contrary to the testimony of Ms. Magee, does not have an inherently uniform tendency to "change from a relatively stiff condition to a liquid mass when it is disturbed."

[227] The Panel testified that the preliminary geotechnical report prepared for the Project confirmed that Leda clay found near the Project's turbine sites is sufficiently consistent, of low sensitivity, and in an area of low topographic relief, to permit construction without the risk of generating any significant retrogressive landslide. The Panel stated that the organic soils in the Project area are mainly composed of organic matter and topsoil, and noted that there are no areas of blanket peat and as such the example raised by Ms. Magee of a landslide in an area of blanket peat in Ireland is not relevant. The Panel also distinguished the other examples of Canadian landslides in

sensitive clay noted by Ms. Magee, stating that: in the case of Saint-Jean-Vianney, the clay soils exhibited sensitivities in the range of 500 to 100 times the typical value in the Project area; and the landslides along the South Nation River were in an area characterized by valley depths on the order of 20 m or more, while the valley slopes are several times smaller in the Project area.

[228] The Panel stated that the Bobcaygeon and Verulam Formations are the two predominant bedrock formations in the Project area, and that the higher yield aquifers in the March, Oxford and Nepean Formations are not exploited in the Project area due to the thickness of the overlying formations. The Panel testified that Ms. Magee was incorrect in asserting that the Project poses a risk to the aquifers in these formations.

[229] The Panel also challenged Ms. Magee's evidence that there is karst topography in the area, noting that the geotechnical investigations by the Approval Holder's geotechnical engineer found that the bedrock in the Project area is a shaly limestone with a high percentage of clay content, inhibiting the formation of karst in the Project area. In response to Ms. Magee's reference to mapping of inferred or potential karst in the Project area, the Panel noted that the legend and report accompanying that map indicated that inferred or potential karst had not been verified by field observations. The Panel testified that: the preliminary geotechnical report, through available borehole logs and observation of the limestone bedrock of an exposed quarry, concluded that there is no karst in the Project area; and the geotechnical investigations indicated that the rock is not karstic. The Panel further testified that Ms. Magee incorrectly characterized the field notes in the Natural Heritage Environmental Impact Study when she said the notes identify five locations as having karst features. The Panel stated that the field notes only mention karst with respect to two locations, describing limestone pavements that have certain surficial fissures typically no deeper than 10 to 30 cm, and emphasized that these features are not karst formations and would not act as a conduit for groundwater infiltration or facilitate karst dissolution features.

[230] Regarding hydrogeology, the Panel said that while a vast majority of the Raisin-South Nation Source Protection Region is mapped as “Highly Vulnerable”, this does not necessarily imply that construction activities in the area pose a significant groundwater quality threat. The Panel stated that recharge rates are a critical factor in determining the local vulnerability of groundwater to vertical contaminant transport and noted that the Project turbines and the vast majority of the Project area are outside of any significant groundwater recharge areas. The Panel further stated that: the construction and operation of wind turbines is not considered a significant threat to underlying aquifers in the area; any penetration of a highly vulnerable aquifer does not increase the vulnerability of the aquifer because the theoretical reduction in vertical travel time is not great enough to alter vulnerability in a meaningful way; and penetration of the upper bedrock, causing upwelling of poor quality groundwater, is highly unlikely to occur because foundations are terminated on competent bedrock and completed with grout or concrete, which seals any drilled foundation holes from water penetration and thus would not connect the contact zone aquifer, where it exists, to any underlying aquifer.

[231] The Panel said that the Appellant’s evidence of impacts on groundwater from turbine installation was based on the erroneous premise that driven piles will be used for the turbine foundations, and stated the Project will use spread footing foundations at 22 turbines and deep foundations at the remaining 11 turbines. The Panel noted that: spread footing foundations use shallow, cast-in-place concrete foundations constructed at the bottom of a shallow excavation with ground improvement if necessary; deep foundations use a spread footing foundation supported by cased, steel, concrete or ground piles installed by drilling/boring or auguring (e.g., micro-piles); and deep foundation elements are added to carry the loads to deeper competent ground such as the glacial till or bedrock. The Panel emphasized that none of the turbine foundations used for the Project involve driven piles or H-piles, and none of them involve driving piles into the bedrock but added that, even if such techniques were used, they would not pose a significant risk to groundwater resources in the Project area.

[232] It was the Panel's opinion that there are no plausible mechanisms for fine soil and rock particles created or displaced during the installation of deep foundations to migrate over 500 m to the nearest wells, given the ground conditions in the Project area. The Panel said that well-known filtration behaviour for granular systems demonstrates that a relatively heterogeneous concentration of fine particles could not travel distances on the order of metres except under the most extraordinary of circumstances, and that the transport of fine rock and soil particles through bedrock fractures depends on a host of factors including the: proximity to a fracture that contains flowing water; water velocity; tortuosity of the flow path; combination of distance and duration of flow relative to particle settling velocity; and degree to which fractures or joints are already filled or partly filled with sediments. The Panel said it is an extremely remote possibility that all of these factors would coincide for fluid to be transmitted at high enough velocities to result in the transport of particles any significant distance.

[233] Regarding ground-borne vibrations, the Panel stated that where events such as blasting, vibratory soil compaction or seismic activity, transmit energy to the ground, the ground particles and groundwater in the immediate vicinity absorb a fraction of the energy and transmit the residual energy to ground and water at consecutively larger radii from the source. The Panel further stated that well-established principles for estimating ground-borne vibrations from construction sources show that vibration magnitudes at distances of 500 m or more from the turbine locations would be expected to be below 0.1 millimetres ("mm") per second. The Panel testified that research done on the North Kent 1 project demonstrates that casing vibrations at a 500 m distance from the pile driving were less than half the value that would be estimated using published theoretical and empirical guidance, and noted that the techniques to be used to install deep foundations for the Project will generate materially lower vibration magnitudes than those associated with pile driving, and therefore pose an even more remote and unlikely influence on wells and groundwater.

[234] The Panel also addressed the experience in Chatham-Kent with the North Kent 1 project in response to Mr. Giorno's testimony. The Panel stated that multiple investigations of well water impacts, including by AECOM and the MECP, confirmed that the identified conditions were unrelated to pile driving but attributed to a variety of natural conditions and problems with well maintenance and construction, including: improper filter installation; rapid or prolonged cycling of pumps; and natural gas in the water. The Panel said Mr. Giorno had ignored the region's well-documented, long-standing history of groundwater and well problems, which preceded wind turbine construction. The Panel further noted that the formations underlying the Project area are not black shale rock and groundwater in this area would not contain the elevated concentration of particles identified by Mr. Giorno.

[235] The Panel gave evidence that, during the operational phase of the Project, vibrations tend to be persistent, of repeating wave characteristics, of a minor magnitude and inconsequential to water well performance, in the opinion of the Panel. The Panel referred to research demonstrating that, at distances similar to those between the Project turbines and the nearest active wells, the magnitude of vibrations at both sites was well below values associated with "cultural noise", such as traffic, industrial and farming operations.

[236] Contrary to Ms. Magee's evidence, it was the Panel's opinion that vertical connectivity between aquifers is highly unlikely to occur during construction because: there will be no deep penetration of the bedrock; the drilled hole is filled and sealed with cement grout, eliminating vertical hydraulic pathways; and the same clay soils that are excavated will be placed back into the excavation and compacted to re-establish hydrogeologic conditions.

[237] Regarding the region's seismicity, the Panel said this is a well-known issue and testified that it had been addressed in seismic site classifications, building codes and engineering design requirements that are taken into account during the design of the foundations and turbine structures. The Panel testified that, if a seismic event were to

occur, it would not heighten or exacerbate any influences of the Project on the environment.

[238] With respect to Mr. Munro's concern about dewatering, the Panel acknowledged that short-term construction dewatering may be required at some of the turbine sites in order to keep the excavations reasonably free of flowing water, but stated that the radius of influence in the short-term would be confined to the near vicinity of the turbine sites and that, in the long-term, the effects on aquifer conditions would be inconsequential. The Panel added that, without long-term dewatering, the presence of foundation elements would be of no consequence to overall groundwater levels or flow rates at water wells several hundred metres or more away from the turbines, and of no consequence to aquifer recharge or discharge to natural environments.

[239] The Panel addressed the mitigation measures in the REA regarding water supply, noting that: if water supply is affected by water-taking, Condition G10 provides that the Approval Holder shall take such action necessary to make an equivalent supply of water available to those affected; and if there is a deterioration in water quality, Condition I8 provides that the Approval Holder must, among other things, provide an adequate quantity of potable water to the well owner until the issue is resolved to the satisfaction of the MECP. The Panel further noted that the Approval Holder has a Monitoring and Sampling Plan for Water Well Supply and is required by Condition I to retain a qualified expert to respond to any complaints regarding wells and well water.

Kenneth Little

[240] Mr. Little testified that neither driven piles nor H-piles would be used for the deep foundations, nor would piles be driven into bedrock. He also responded to a question of the Tribunal concerning recommendations by Neem Tavakkoli to the MECP, discussed below, stating that: the recommendations had been used as guidance for the Approval Holder's geotechnical work in the field; the initial analysis had assisted with constructability of the project and understanding site-by-site characteristics at the initial

design stage; and the final geotechnical report would be done in consultation with the MECP, and with Mr. Tavakkoli's input or using his recommendations as guidance.

Evidence of the Director

[241] The Director called two opinion witnesses on the groundwater issue: Messrs. Kinney and Tavakkoli.

Shawn Kinney

[242] Mr. Kinney was qualified to provide opinion evidence as a professional geoscientist with expertise in hydrogeology. He is employed as a hydrogeologist by the MECP and supervised the hydrogeological review of the Project prior to the issuance of the approval.

[243] In response to concerns raised by the Appellant's witnesses about the possibility of adverse groundwater impacts similar in nature to those experienced in Chatham-Kent, Mr. Kinney stated that it is highly unlikely that the impacts that are alleged to have occurred at the North Kent Wind 1 Facility will occur at the Project due to significant differences in hydrogeology. He testified as follows concerning the geology of the respective locations of these projects: the North Kent Wind 1 Facility overlies the Kettle Point Formation shale, whereas the Nation Rise Wind Project overlies the Gull River, Bobcaygeon, and Verulam limestone bedrock formations; the Kettle Point Formation is a fine-grained shale rich in minor and trace metals (e.g., sulphur, uranium and lead) and petroleum, has been a relatively low-yielding aquifer for the past 15 years, has weak bedding planes, and produces poor quality groundwater due to naturally-elevated concentrations of sodium, iron, chloride and total dissolved solids; the three types of bedrock underlying the Project are predominantly coarse-grained limestone, fossil-rich limestone and calcium-rich shale, unlike the carbon-rich and structurally fragile Kettle Point shale; and the bedrock underlying the Project is known to have relatively good water-yielding capability and groundwater that is generally suitable for domestic use, but

with some samples having poor water quality due to naturally-elevated sodium and total dissolved solids.

[244] Regarding concerns about adverse groundwater impacts due to construction activities, Mr. Kinney referred to two quarries situated to the north and south of the Project area, which he said provide valuable examples of long-term, large-scale subsurface disturbances in the three types of bedrock underlying the Project site. He testified that the magnitude and duration of the actual geologic disturbance induced by these quarry operations exceed anything contemplated during the construction and operation of the Project, in both inferred karst and non-karst environments. Mr. Kinney noted that multiple residences are located within 500 m of both quarries and the MECP does not have any records on file of complaints about reduced water supply or water quality attributed to either quarry. On this basis, it was his opinion that groundwater supplies within the Gull River, Bobcaygeon and Verulam bedrock may be relatively insensitive to vibration-induced water quality or water quantity effects. Mr. Kinney further provided his opinion that smaller-scale excavation and pile driving for wind turbine infrastructure, conducted at a greater distance from receptors, would not cause serious and irreversible harm to groundwater resources.

[245] With respect to concerns about the suspension of particles in the groundwater, Mr. Kinney stated that suspension is a temporary condition in the absence of a constantly applied force to counteract gravity, and the rate at which particles settle under the force of gravity varies based on particulate diameter, mass and water temperature; as an example, clay particles of less than 0.001 mm in diameter will settle in a matter of hours. He provided his opinion that any turbid groundwater event will invariably be a temporary condition that will not cause serious and irreversible harm to groundwater resources.

[246] Mr. Kinney also addressed general groundwater concerns by noting the protective measures in the REA conditions, Part X of the *EPA* and the *Clean Water Act, 2006* regime that applies to highly vulnerable aquifers. He testified that the REA

includes protective measures in the following conditions: Condition I, compelling the Approval Holder to establish baseline conditions, and address and resolve any water quality impacts that are reported; Condition L, compelling the Approval Holder to establish a groundwater monitoring program under the oversight of the MECP; and Condition G, compelling the Approval Holder to measure and record all water takings on site, and resolve water quantity impacts that are reported or detected. Regarding the general concern of contaminant spillage, Mr. Kinney noted that Part X of the *EPA* applies, as well as Conditions H and M of the REA, which require spill control and response plans. He further stated that, although the Project is located in a designated “highly vulnerable aquifer area”, this does not prohibit all development, noting that activities prescribed as drinking water threats are listed in s. 1.1 of O. Reg. 287/07. Mr. Kinney said there was no indication that the Approval Holder intends to conduct any such activities during the construction, operation and decommissioning of the Project.

Neem Tavakkoli

[247] Mr. Tavakkoli was qualified to provide opinion evidence as a professional engineer with expertise in geotechnical site characterizations and foundation design. He was retained as a consultant by the MECP to review technical reports and provide advice on the geotechnical aspects of the Project. Mr. Tavakkoli noted that he reviewed the Approval Holder’s March 15, 2018 submission to the MECP, which included a feasibility technical memorandum and set of recommendations prepared by the Approval Holder’s geotechnical engineering consultant (“feasibility technical memorandum”), and participated in June 13, 2018 discussions with that consultant. Mr. Tavakkoli provided his opinion that it is feasible from a foundation design perspective to construct and operate the Project, as long as his comments and recommendations, and minimum requirements for design methodology, are followed.

[248] Mr. Tavakkoli recommended that, at minimum, all of the requirements of the Canadian Foundation Engineering Manual, particularly Chapter 14, should be reviewed and addressed in the geotechnical report. He emphasized the requirements in Chapter

14 of that document, which address machine foundations, and highlighted his recommendations, which include: a laboratory testing program; site investigations for the design of access roads; and evaluation of the risk of landslide at each site.

[249] Mr. Tavakkoli further recommended that the wind turbine foundations be designed and checked for machine foundation requirements based on expected vibration. Based on the data available so far, he indicated that there are three types of foundation strata expected in the Project area: clay underlain by bedrock, bedrock and till. Mr. Tavakkoli testified that a complete geophysical test is necessary for each site to obtain the shear wave velocity of different soil layers, which is used to calculate parameters relating to the interaction between the soil and foundation. Noting that the Approval Holder intends to design the turbine foundation on clay deposits using an end bearing pile system, he recommended that a geophysical survey be completed for each deep foundation site to the extent that the rock topography is known, for all vertical and batter piles. Mr. Tavakkoli identified an inconsistency between the feasibility technical memorandum, which recommended drilled piles designed based on side-wall resistance, and his discussion with the geotechnical engineers, who mentioned their intention to design end bearing values. Regarding this discrepancy, he stated that his personal preference was to design based on side-wall resistance, but further noted that the engineer on record is solely responsible to provide the factor of safety required by the design.

[250] Mr. Tavakkoli stated that the Approval Holder and the geotechnical engineer propose to drill one borehole per wind turbine site, but testified that he would recommend that additional investigation be required and additional boreholes drilled if the geophysical testing indicates inconsistency in the site stratigraphy. He also recommended that: the geotechnical report should include a monitoring program to document performance of the wind turbines for both vertical and translational movements; this program should provide that monitoring reports are prepared by a licensed surveyor and submitted to the MECP; and the design engineers should be responsible for increasing the monitoring frequency or scope if necessary.

[251] Regarding Ms. Magee's evidence, Mr. Tavakkoli disagreed with her conclusion that any Leda clay site should be avoided in terms of development. In his view, she provided general facts about Leda clay from published literature but generalized the risk of retrogressive landslide to all areas covered by Leda clay. Mr. Tavakkoli testified that landslides can occur on Leda clay sites but all sites do not have an equal risk of failure, noting that factors such as distance to flow channels and drainage, the direction of drainage channels, gradation, clay mineralogy and site topography can contribute to a higher risk of failure. It was his opinion evidence that a landslide risk assessment must be completed for all sites.

Discussion, Analysis and Findings on Issue 3

Submissions

Appellant's Submissions

[252] The Appellant submits that engaging in the Project in accordance with the REA will cause serious harm to human health and serious and irreversible harm to plant life, animal life or the natural environment in connection with groundwater-related matters. In its submissions, the Appellant refers to the concerns in relation to groundwater expressed by Mr. Winters, Ms. Mekker, Ms. Walkey Skinner, Mr. Pethke, Ms. Daoust, Ms. Cyr and Mr. Reveler. In particular, the Appellant notes Ms. Daoust's evidence that she experienced sediment and discolouration in her well water shortly after the Approval Holder conducted test borehole drilling near her residence, and Ms. Cyr's evidence that her tap water ran brown two days after a well drill worked at a site 1.3 km from her residence. The Appellant further refers to the evidence of Mr. Reveler regarding indicators of karst formations on his property.

[253] The Appellant also refers to the technical evidence of Mr. Munro concerning the risk of groundwater contamination and, in particular, his evidence that the Project area is in proximity to both the Vars-Winchester esker and the Crysler-Finch esker, neither of which were addressed in the Approval Holder's assessment review or the monitoring program required by the MECP. The Appellant further notes Mr. Munro's evidence that: high water flows in the contact zone, above the bedrock and below the overburden soils; many individual domestic wells are situated in the overburden material above the bedrock and are either dug or sandpoint wells; and many owners tend to use overburden wells as their primary source of drinking water.

[254] The Appellant notes Mr. Giorno's evidence concerning wind turbine projects in Chatham-Kent, including North Kent 1, in which multiple turbines were located on highly vulnerable sections of the underlying aquifer and residents complained of sediment ingress in domestic wells soon after the start of construction that continued until after the start of operations. The Appellant submits that while the North Kent 1 proponent's consultants claim that all problems with wells in the zone of that project are due to naturally-occurring water quality issues in the region and the Ministry has accepted these claims, neither the North Kent 1 consultants, nor the Ministry have provided evidence that well interference complaints prior to the start of construction on North Kent 1 were submitted with the same frequency as those after the start of construction, as would be expected if variable water quality was the cause of all the complaints.

[255] The Appellant bases much of its case on the groundwater issue on the opinion and technical evidence of Ms. Magee regarding the geological context of the Project and the following issues that had not been adequately addressed: landslide hazards due in part to Leda clay; karst topography and other vulnerabilities in the area; and groundwater and well-water contamination from Project activities. The Appellant asserts that the Project is located in a region with high susceptibility to landslides and prone to earthquakes and, due to the nature of the clays, vibration tends to be accelerated. The Appellant further asserts that the proposed turbines are in close proximity to towns and rural residences that depend on a shallow, productive, highly

vulnerable aquifer for their potable water source. The Appellant argues that the Project documents failed to sufficiently address the geotechnical risks that are significant in the region. The Appellant refers to Ms. Magee's evidence concerning the impacts of wind turbine construction activities in Ireland, in an area of blanket peat (also a sensitive clay terrain) that led to a landslide in 2003.

[256] The Appellant submits that the Project may negatively affect shallow wells at the contact zone between bedrock and overburden on a highly vulnerable aquifer, as a result of pile driving or drilling, blasting and the operational vibration of the turbine generator and mechanical parts, causing silt and clay particles to be shaken and to enter into water wells through karst fissures. The Appellant further submits that a well monitoring program will not prevent the impacts associated with the construction and operation of an industrial wind farm, nor will monitoring necessarily resolve any problems once the Project is operational.

[257] Regarding Ms. Magee's evidence relating to water problems in the Chatham-Kent area, the Appellant puts forward her testimony that where a conclusion in science does not match results, the hypothesis must be reconsidered. The Appellant asserts that just because the relationship between the Chatham-Kent wells' change in quality and the introduction of vibrations is not understood does not mean that they are not linked, and that there is a need to revisit the science and to re-evaluate and re-assess other potential pathways for contamination. The Appellant submits that, while North Stormont may be located in a different geologic setting from Chatham-Kent, both are located on a highly vulnerable aquifer, and construction and operation of the Project could cause very fine clays to flow into local wells, with significant impacts. In response to evidence that quarries have operated in the North Stormont area without causing such impacts, the Appellant states that quarries are not equivalent to wind projects.

[258] The Appellant also submits, based on Ms. Magee's evidence, that the Approval Holder must undertake a landslide hazard assessment, as well as geotechnical and laboratory studies to ascertain the properties of the materials in the region, including the

community's seismic conditions, the presence of karst and the effects of Leda clay, before the Project proceeds further. Regarding the relevant REA conditions, the Appellant submits that there is a gap in the requirement for further geotechnical investigations in that the Approval Holder need not consider the potential impacts of Project construction and operation on adjacent wells. The Appellant takes the position that the REA was granted before the necessary geotechnical work was completed and there is not sufficient information to understand all of the risks of the Project, such as landslide hazards, and groundwater and well water contamination.

[259] The Appellant makes reference to Mr. Kinney's testimony, particularly his agreement that there were likely wells in the area not captured by the MECP's well water data and not currently identified by the Approval Holder, and that the REA conditions do not specifically require the Approval Holder to contact every resident in the Project area.

[260] Regarding the evidence of Mr. Tavakkoli, the Appellant submits that after reviewing the Approval Holder's preliminary geotechnical report, he recommended: a feasibility study, followed by a more detailed investigation; an instrumentation and monitoring program before, after and during Project operation; site specific investigations including the exact depth to the rock and shear wave velocity of the overburden for soft soil due to the machine foundations, vibration and seismicity; and physics tests. The Appellant asserts that Mr. Tavakkoli gave evidence that the Approval Holder's first investigation, based on one borehole per site, was not adequate. The Appellant further asserts that Mr. Tavakkoli testified that the Approval Holder should follow the Canadian Foundation Engineering Manual, which states that the monitoring program shall include measurements of water pressure from the foundation on the soft soil and consider the risk of landslide hazard for each site.

[261] The Appellant also refers to Mr. Tavakkoli's evidence that Condition R of the REA did not specifically capture or require all of the elements he recommended, and that, while the Project was feasible, the risks would have to be considered, identified

and analyzed. The Appellant notes that he further stated that information was missing from the Approval Holder's investigations, such as particle size analysis of soil samples, that further investigation of hazards is needed, and that he had not been provided with definitive information as to what kind of system, equipment or method would ultimately be used.

[262] Regarding the panel of Dr. Novakowski, Dr. Boone and Mr. Byerley, the Appellant observes their evidence that the Project area is located mostly in a zone with a high rate of surface water recharge, mostly due to the thinness and relative permeability of the overburden sediments, and that 85% of the wells identified in the MECP water well records have inlets that are located within the fractured bedrock below the overburden. The Appellant submits that the geological maps included in Golder Associates' Technical Memorandum indicate that at least a dozen of the proposed turbine sites are located in areas where the overburden is glacial till, and at least 10 of the sites have a glacial till overburden depth of only 3 to 5 m above bedrock, and notes that fractures in glacial till can increase the permeability of the till layer by 2 to 3 orders of magnitude, and the potential for the turbines to produce such fractures has not been considered.

Approval Holder's Submissions

[263] The Approval Holder submits that the Appellant has not met its onus of proving that engaging in the Project in accordance with the REA will cause either serious harm to human health or serious and irreversible harm to plant life, animal life or the natural environment in connection with groundwater-related matters; instead, it submits, the evidence led by the Approval Holder and the Director establishes that the Project will not cause any such harm. The Approval Holder argues that the Appellant's groundwater-related appeal is rooted in unsubstantiated allegations that the Project has the potential to cause harm and the evidence the Appellant presented, at its highest, amounts to a general expression of concern in areas of hydrogeology and geotechnical engineering in which its witnesses and the Presenters have no expertise.

[264] Regarding the issue raised by the Appellant as to whether construction of the Project would cause the transmission of fine soil and rock particles through groundwater so as to impact local drinking water wells, the Approval Holder asserts that its evidence confirmed that no piles are expected to be used at the 22 turbine locations where shallow foundations are possible, and no driven piles will be used at the remaining 11 turbine locations where deep foundations are necessary. The Approval Holder notes Mr. Little's evidence that none of the deep foundations will use driven piles or H-piles, or involve driving piles into bedrock, as well as Mr. Tavakkoli's evidence that this approach will cause less disturbance to the soft soil.

[265] The Approval Holder states that Ms. Magee acknowledged that the Approval Holder does not intend to use pile driving but remained concerned about the potential transmission of fine particles as a result of construction techniques involving even a small degree of bedrock penetration. The Approval Holder notes that her concern focused on the shallow wells that draw water from the intermediate zone between the bedrock and overburden, known as the contact zone aquifer, and that she testified that the deeper wells are at lower risk of potential impacts because they are protected by the silt-clay unit, which allows for slow infiltration of surface water and limits contamination of groundwater by surface water.

[266] The Approval Holder submits that this protected deeper aquifer in the upper bedrock is the primary source of drinking water in the Project area, referring to Mr. Byerley's evidence that most wells within 1 km of the Project location are deep wells that obtain their water from the upper bedrock. The Approval Holder further submits, however, that the evidence of the Approval Holder and the Director established that Project construction will not cause fine particles to be transmitted by groundwater to local drinking water wells, whether those wells are shallow or deep. Based on this evidence, the Approval Holder asserts that: the Project is located sufficiently far away from any drinking water wells to avoid any impact; fine particles are extremely unlikely to be transmitted any significant distance; eskers in the area would not act as a conduit

for any fine particles disturbed at the Project site and there is no mechanism by which groundwater at the turbine locations could impact groundwater in the eskers; while the Project area is mapped as a “Highly Vulnerable Aquifer”, this term is broadly defined to include any aquifer that is located close to ground surface and under this definition much of Ontario sits on a Highly Vulnerable Aquifer; and based on the extensive site-specific data, the Approval Holder’s experts concluded that the construction and operation of wind turbines is not a significant threat to underlying aquifers in the area.

[267] In response to the Appellant’s suggestion that there is potential for the Project to cause the transmission of fine particles if karst is present in the Project area, the Approval Holder submits that geotechnical investigations and field observations completed for the Project do not show any karst, and that its experts concluded that the rock is not karstic at the turbine sites within any depth of concern for influence on or by foundation construction and none of the surficial features identified in the Project area would act as a conduit for groundwater infiltration or facilitate karst dissolution features.

[268] The Approval Holder further submits that Condition I of the REA includes additional requirements for it to address water wells, and argues that the REA ensures that stringent measures will be taken to protect local drinking water wells.

[269] Regarding the Appellant’s concern that ground-borne vibrations resulting from construction or operation of the Project have the potential to impact local drinking water wells by disturbing fine particles, the Approval Holder notes the evidence that the magnitude of vibrations caused by turbines are very small and dwarfed by “cultural noise” such as the vibrations from passing cars, and that ground vibrations dissipate relatively rapidly away from the source of the vibration. With respect to the concern that blasting activities for the Project might have a greater vibration impact than the operation of a quarry, the Approval Holder submits that the vibrations from turbine construction would not remotely approach the impact of quarrying, and further submits that there was no evidence on how karst topography, if it existed, could act as a conduit for vibrations. The Approval Holder asserts that much of the Appellant’s evidence on

the question of vibration pertains to other wind projects in Ontario rather than the Project, and does not demonstrate discernable vibration impacts at those projects or parallels between conditions at the sites.

[270] Regarding the Appellant's concerns about well water quality near turbines in Chatham-Kent, the Approval Holder submits that the respondents' expert evidence disproved any association between construction activities at those projects and impacts at nearby water wells. The Approval Holder states that Mr. Giorno's evidence was based on hearsay and that, as a technical witness, he could not provide an opinion on whether the Chatham-Kent project activities caused the alleged impacts.

[271] The Approval Holder addresses the complaints of Ms. Daoust and Ms. Cyr concerning impacts to their well water, noting that Ms. Daoust stated that she found sediment in her water without providing specific details, and Ms. Cyr said that brown water came out of her tap on June 2, 2018 after seeing a well driller about 1,400 m away from her property on May 31, 2018. The Approval Holder submits that this testimony does not support a conclusion that geotechnical investigations for the Project impacted local wells, noting the expert evidence that there is no plausible mechanism for groundwater impacts to occur hundreds of metres from deep foundation construction as any such impacts would not be expected to travel more than approximately 15 m, and further stating that it would be exceedingly unlikely that less invasive geotechnical investigations would cause the impacts described by Ms. Daoust and Ms. Cyr. The Approval Holder also submits that sediment in a well is usually the remnants of well drilling or related to construction of the well, and that a number of causes relating to well construction and maintenance contribute to contamination. The Approval Holder notes that there are REA conditions that further mitigate the potential for any vibration impact resulting from the Project.

[272] Noting that Ms. Magee expressed a general concern that dewatering required for the construction or operation of the Project could impact local drinking water supplies, the Approval Holder submits the opinion evidence of its witnesses that, given the

significant distance to the nearest water wells, the effects of short-term dewatering on these wells or on general long-term aquifer conditions would be inconsequential.

[273] Regarding the Appellant's argument, based on Ms. Magee's evidence that the Project has the potential to cause land stability issues and landslides due to the presence of Leda clay, the Approval Holder asserts that her evidence does not demonstrate that the Project will cause such harm because she did not evaluate site-specific conditions but addressed landslide risk generally. To support its assertion, the Approval Holder notes that Ms. Magee relied on: a landslide susceptibility map with qualifiers that it should be used only as a guide and not for planning, design or construction or to replace a site-specific geotechnical investigation; and a map showing historical landslides along the South Nation River which, as she acknowledged, showed landslides that occurred north of Highway 417 whereas the Project is a significant distance south of the highway. The Approval Holder submits that in these two areas, the character of the topography and one of the principal driving mechanisms for land stability is different because the Project area is characterized by low relief that only slightly slopes towards the South Nation River. The Approval Holder submits that the Project poses no significant risk to land stability even where it will be constructed on Leda clay, referring to other factors such as land topography and nearness to a flowing water course that must be considered in determining landslide risk, and submitting that the Project is feasible from a foundation design perspective and does not present any major risk. The Approval Holder observes that Mr. Tavakkoli disagreed with Ms. Magee's suggestion that broader analysis of land stability should be conducted.

[274] The Approval Holder states that Ms. Magee's evidence amounted to a recommendation for further assessment, including a landslide hazard assessment and geotechnical and laboratory studies, and adds that she acknowledged that this work was underway. The Approval Holder further states that laboratory studies have been completed, as has an assessment of slope stability, which concluded that the landslide potential at the South Nation River did not extend to any area in which Project construction would occur. The Approval Holder notes that Condition R of the REA

provides a further protective measure by requiring it to complete a detailed geotechnical investigation report to be submitted to the MECP for approval before construction starts. The Approval Holder notes that it has confirmed that the geotechnical investigation required by Condition R will be informed by Mr. Tavakkoli's recommendations. The Approval Holder submits that the evidence establishes that it is extremely unlikely that the Project will cause any land stability issues and, in any event, work is required to mitigate any risk.

[275] With respect to the Appellant's evidence that the Ottawa Valley is prone to earthquakes and Ms. Magee's suggestion that landslides may be more prevalent in the Project area due to the combination of seismic activity and Leda clay, the Approval Holder points out that the Appellant did not claim that the Project will increase the propensity of earthquakes or of land instability in the event of an earthquake. The Approval Holder submits that geotechnical engineers have considered the potential for seismic activity in designing the Project, and further submits that the Project will not increase the propensity of earthquakes in the region or of land instability in the event of an earthquake.

[276] The Approval Holder notes that the Appellant's evidence broadly suggested that the installation of the Project turbines may result in increased flooding due to a diminished capacity of the area around turbines to absorb run-off and groundwater level changes. The Approval Holder submits, however, that even though concrete will be used for turbine foundations, the water will still run off and go into the ground, so there will be no impact on the greater hydrogeological environment.

[277] The Approval Holder addresses a number of additional submissions by the Appellant, submitting that: the Project turbines and vast majority of the Project area are located outside of any significant groundwater recharge area or in locations where high recharge rates are not expected; Ms. Magee acknowledged that water wells with inlets located in the bedrock are at lower risk of having potential issues given that the silt-clay unit above impeded infiltration of surface water; and the Appellant led no expert

evidence proving that Project construction will fracture the glacial till or that any such fractures will increase the till's permeability.

Director's Submissions

[278] The Director submits that the expert evidence tendered by the Director and the Approval Holder refuted the Appellant's assertion that construction activities will cause groundwater to become contaminated with sediments. The Director reviews the evidence provided at the hearing, and submits that it demonstrates that the construction and operation of the Project is unlikely to cause groundwater contamination. The Director asserts that the only expert evidence tendered at the hearing concluded that construction activities at this location are unlikely to cause the groundwater to become contaminated with sediment and that, in the unlikely event that some turbidity does result, it is highly unlikely that the sediments will travel hundreds of metres before settling out. The Director further asserts that turbidity episodes in groundwater are generally short-lived and not irreversible.

[279] The Director submits that the only expert evidence provided that specifically addressed vibration when the wind turbines are in operation indicated that the vibration levels dissipate very quickly and are therefore very low at distances of a few hundred metres away. It is the Director's position that there is almost no possibility that the ongoing operation of the Project will have any impact on residential wells located at least 200 m from any turbine, with most being 500 m or more away.

[280] The Director submits that, despite the very low probability of groundwater contamination occurring: Condition I of the REA requires the Approval Holder to establish baseline groundwater conditions in residential wells located within 1 km of any wind turbines, to respond to and investigate any complaints received, and to implement contingency plans if required; and Conditions J, K and L require extensive monitoring of construction activities. Citing *Greenspace Alliance of Canada's Capital v. Ontario (Director, Ministry of the Environment)*, [2009] O.E.R.T.D. No. 38 at para. 139, the

Director submits that Tribunal has previously ruled that where environmental harm is unlikely, it is consistent with the precautionary approach for the Director to approve the activity and include measures to prevent harm or to confirm the predictions.

[281] Regarding the Appellant's concern that groundwater contamination may occur as a result of landslides, the Director states that, while the Project is located in a region in which Leda clay is present, there is no evidence that this will result in landslides occurring. The Director asserts that none of the other factors discussed in Mr. Tavakkoli's evidence, which contribute to landslides occurring, such as steep slopes, are present and further asserts that all of the expert engineering evidence concurred that it is feasible to construct the turbines at the Project site.

[282] The Director notes that Mr. Tavakkoli indicated that the Approval Holder must still conduct a detailed evaluation of each site prior to construction, and that it is a common industry practice to first assess the feasibility of proceeding with a project based on initial investigations, and to subsequently complete detailed design prior to proceeding to the construction phase. The Director states that Mr. Tavakkoli provided the Approval Holder with steps he expects them to take in conducting a geotechnical assessment of each turbine site at the detailed design stage, and that Condition R1 of the REA prohibits the Approval Holder from constructing any turbine foundations until a supplementary detailed geotechnical investigation report is submitted and accepted by the Director. The Director submits that the Project therefore cannot proceed until the conclusions of the feasibility study are confirmed for each turbine site.

[283] Regarding Ms. Magee's evidence concerning a landslide that occurred in Ireland, the Director notes that it occurred where a wind facility had been constructed in blanket peat. The Director asserts that there was no evidence provided at the Hearing to demonstrate that blanket peat is similar or analogous to Leda clay and submits that this information should be given little weight.

[284] The Director also asserts that there is a low likelihood of the other possible impacts relating to groundwater that were raised by the Participant, Presenters and Appellant's witnesses. The Director submits that the likelihood of a serious spill occurring at the Project is very low, noting that: there are no large sources of contaminants such as chemicals and fuel; where larger quantities are stored, such as at the transformer station, Condition M1 of the REA requires that a spill containment facility be installed; and Condition H requires the Approval Holder to develop and implement a stormwater management and erosion control plan, while Condition H12 specifically requires that stormwater or runoff does not contain any detectable quantities of petrochemicals.

[285] Regarding the concern raised about dewatering, the Director states that dewatering will only occur for the duration of the construction of a foundation, collection line and access road, and may generate small localized changes on groundwater flow immediately adjacent to the foundation location but will not cause impacts at distances of hundreds of metres as one might expect from a large scale dewatering operation such as a quarry. The Director adds that Condition G requires the Approval Holder to comply with the dewatering procedures set out in its application to ensure no adverse impacts occur. The Director notes that the footprints of the wind turbine foundations and associated infrastructure only constitute a very small portion of the overall Project site and therefore, there is very little reason to believe that the infrastructure will have any impact on surface water drainage in the area.

[286] The Director submits that the evidence demonstrates that the construction and operation of the Project is unlikely to cause groundwater contamination, noting that the Appellant must demonstrate that the Project will cause serious and irreversible harm on a civil standard of a balance of probabilities, and that evidence that only raises the potential for harm will not meet the onus of proof.

Analysis and Findings

[287] As noted above, with respect to groundwater-related issues, the Appellant submits that engaging in the Project in accordance with the REA will cause both serious harm to human health and serious and irreversible harm to plant life, animal life or the natural environment. The analysis of those legal tests is discussed above in relation to the other issues and is applied below.

[288] The Appellant raises numerous issues relating to whether the Project will result in impacts on groundwater. A number of those issues relate to impacts on local drinking water wells due to: fine soil and rock particles at the Project site being disturbed and transmitted in groundwater during construction; ground-borne vibrations from the construction or operation of the Project disturbing fine soil or rock particles; and dewatering activities for the Project. Additional groundwater-related concerns raised by the Appellant are that there could be a relationship between construction or operation of the Project and landslides or land stability issues, seismic activity, spills or flooding.

[289] Regarding all of the groundwater-related issues, the Tribunal has weighed the evidence of the Participant and Presenters and the Appellant's witnesses against the evidence provided by the Approval Holder and Director. The witnesses for the Appellant included two fact witnesses, two technical witnesses and only one opinion witness, Ms. Magee, who was qualified to provide both opinion evidence (as an environmental scientist specializing in multidisciplinary science integration in environmental assessment) and technical evidence (based on her knowledge and experience in groundwater contamination and geological analysis). The Tribunal has taken the nature and extent of expertise of the various expert witnesses into account in reaching its findings.

[290] The Appellant's concern that construction may disturb fine soil and rock particles at the Project site and transmit it in groundwater was addressed in the evidence of Ms. Magee and Mr. Giorno, which was based at least in part on their understanding that

pile driving would be used in constructing the Project turbines. Ms. Magee stated that construction activities such as pile driving could have an impact on the shallow highly vulnerable aquifer, referring to concerns in Chatham-Kent that wells had been impacted by pile driving for turbines, and also stated that construction could open pathways for surface water and groundwater interactions, leading to contamination of the shallow aquifer through surface runoff. Mr. Giorno also linked pile driving in the Chatham-Kent area to complaints by residents in that area about well interference. However, the Tribunal is satisfied, based on Mr. Little's evidence, that the Approval Holder does not intend to use pile driving to construct the Project and instead will use spread footing and deep foundations.

[291] The Tribunal accepts the evidence of Ms. Magee that deeper groundwater aquifers are protected by the silt-clay unit, allowing for slow infiltration of surface water and limiting contamination of groundwater by surface water, and further accepts Mr. Byerley's evidence that most wells within 1 km of the Project are deep wells that obtain their water from the upper bedrock below the level of the contact zone aquifer. Ms. Magee agreed that area residents use deeper aquifers for their groundwater well supplies but remained concerned that Project construction could lead to sediment in shallow wells that draw water from the contact zone aquifer, due to karst topography and the highly vulnerable aquifer in the area.

[292] The Tribunal, however, accepts the opinion evidence of the Approval Holder's and Director's witnesses, summarized above, that groundwater will not transmit particles to local drinking water wells as a result of Project construction, regardless of whether those wells are shallow or deep, because of the distance of those wells from the Project, which is outside the municipal WHPA. The Tribunal accepts the opinion evidence of the Panel and Mr. Kinney that there are no plausible contaminating mechanisms for fine soil and rock particles created or displaced during the installation of deep foundations to migrate over 500 m from those foundations to the nearest wells. In particular, the Tribunal accepts the opinion evidence of Dr. Novakowski, who was qualified as a hydrogeologist with expertise in fractured rock, that it is highly unlikely that

fine particles will be able to migrate more than 10 to 15 m due to the permeability of the bedrock in the Project area.

[293] The Appellant's witnesses also suggested that there was potential for fine particles to travel due to the presence of highly vulnerable aquifers, eskers and karst in the Project area. However, having reviewed all of the evidence in relation to these potential mechanisms, the Tribunal accepts the opinion evidence of the Panel that much of Eastern Ontario is mapped as a highly vulnerable aquifer, which Ms. Magee acknowledged, and that the geotechnical investigations of the Project area indicate that the construction and operation of the turbines will not threaten underlying aquifers. Regarding the eskers in the vicinity of three of the Project turbines, the Tribunal accepts the hydrogeological opinion evidence of Mr. Kinney and Dr. Novakowski that there is no mechanism by which groundwater at the turbine locations could have any impact on groundwater in the eskers. With respect to the potential for karst in the Project area, the Tribunal observes that the mapping provided by Ms. Magee refers to inferred and potential karst rather than known karst, and accepts the opinion evidence of Mr. Tavakkoli that the presence of karst must be confirmed by geotechnical investigation, and the opinion evidence of Dr. Novakowski that the geotechnical investigations done to date for the Project location do not show any karst. The Tribunal further accepts the opinion evidence of the Panel that surficial fissures in limestone bedrock exposed at the surface in the vicinity of the Project would not provide a conduit for groundwater infiltration or facilitate karst dissolution features.

[294] The Tribunal notes that Condition I of the REA requires the Approval Holder to: conduct a water well survey; complete pre-construction monitoring of well quality; complete post-construction monitoring of any wells for which water quality complaints are received; and provide potable water in the event any impacts are identified by a qualified expert. The Tribunal is satisfied that these conditions are adequate to address any potential issues regarding fine soil and rock particles being disturbed and transmitted in groundwater.

[295] The Appellant also raised an issue concerning the potential for ground-borne vibrations from the construction or operation of the Project to disturb fine soil or rock particles, resulting in impacts on local drinking water wells. Ms. Magee testified concerning this potential issue but acknowledged that she was not a hydrogeologist. The Tribunal did, however, hear opinion evidence on this issue from Dr. Boone, a geotechnical engineer with expertise that includes measurement of ground vibrations, and Mr. Kinney, a hydrogeologist. Mr. Kinney said that ground vibrations dissipate relatively rapidly away from the source of the vibration. Mr. Kinney had only heard of vibration-induced turbidity after a particularly large blast at a quarry, and said that the MECP's Cornwall office, which covers the Project area, had not received any complaints about the impact of quarry activities on drinking water wells in the vicinity of the Project area, and that blasting for a Project turbine would be less than what would occur in a quarry. Dr. Boone stated that vibrations from construction would diminish rapidly and not result in particles in wells 200 to 500 m or more away from the Project area, and further stated that vibrations from a turbine would be very small and dwarfed by "cultural noise", such as passing cars.

[296] Regarding Mr. Giorno's evidence that turbine construction in Chatham-Kent caused turbidity in drinking water wells, the Tribunal heard evidence from Dr. Boone, who said he was extensively involved in the North Kent 1 project in Chatham-Kent, and who agreed with the conclusion of the MECP that there was no causal relationship between the turbines and well water issues experienced by residents of the area. He stated that investigations indicated that the well water issues resulted from a variety of natural conditions and problems with the construction and maintenance of those wells, and not from pile driving. The Tribunal accepts Dr. Boone's evidence that Chatham-Kent has a history of problems with groundwater and wells, predating turbine construction and relating to the different hydrogeology in the Chatham-Kent area, compared to the Project area, which was described by Mr. Kinney. The Tribunal has not been provided with any evidence that the experiences in the Chatham-Kent area have any relevance to the Project currently before the Tribunal for consideration.

[297] The Tribunal accepts the evidence of Ms. Cyr and Ms. Daoust that they experienced issues with their well water during a time when the Approval Holder was conducting geotechnical investigations in the Project area. However, the Tribunal has not been provided with any evidence to establish that these water problems were caused by activities relating to the Project. Rather, the Tribunal has heard opinion evidence that there was no plausible mechanism for geotechnical investigations, or even for deep foundation construction, to have an impact on wells hundreds of metres away, as set out above. The Tribunal accepts that evidence, as well as Mr. Byerley's evidence that sediment in wells is usually due to the construction of the well or remnants of well drilling. The Tribunal also notes Mr. Munro's technical evidence that there are numerous causes that could contribute to well contamination.

[298] The Tribunal is satisfied, based on the opinion evidence that it heard, that the following REA conditions will address the concerns about potential vibration issues raised by the Appellant: Condition I, requiring a detailed investigation of any water well issues, a supply of potable water if issues are identified by a qualified expert and resolution of any issues shown through an investigation to result from the Project; Condition K, requiring that a qualified expert develop a ground-borne vibration monitoring program; and Condition L, requiring the implementation of a groundwater monitoring program to be approved by the MECP prior to the commencement of any blasting activities for the construction of the Project.

[299] Regarding dewatering, Ms. Magee raised a concern that dewatering activities for the Project could have a greater impact on local drinking water supplies than a quarry would, but she did not provide evidence explaining how she formed this opinion. The Approval Holder, however, responded with the evidence of the Panel that the effects of short-term dewatering on the wells or long-term aquifer conditions would be inconsequential, given the significant distance to the nearest wells, and there would be no long-term water taking for the Project. The Tribunal accepts this opinion evidence and is satisfied that it has heard no evidence that harm to groundwater resources will be caused by short-term dewatering required for construction of the Project. The Tribunal

further notes that Condition G of the REA requires the Approval Holder to comply with water taking procedures set out in its application.

[300] Regarding the Appellant's issues concerning potential landslides and land instability, the Tribunal heard detailed evidence from Ms. Magee. Although she is registered as a professional geoscientist, she acknowledged that she is not an expert on land stability issues or geotechnical engineering. In response to these issues, the Tribunal heard opinion evidence from Mr. Tavakkoli and from the Panel.

[301] As Ms. Magee stated, there have been landslides documented along the South Nation River, north of Highway 417, which is north of the Project area. However, Dr. Boone stated that the topography north of Highway 417 is very different from that of the Project area, which is characterized by low relief and is only slightly sloping to the river. Mr. Tavakkoli confirmed Ms. Magee's evidence that there is Leda clay in the vicinity of the Project but testified that the presence of Leda clay is not the only factor that contributes to the risk of a landslide, noting other factors such as site topography, the distance to flow channels and drainage, the direction of drainage channels, gradation and clay mineralogy. The Panel stated that Leda clay found near the Project area is sufficiently consistent, of low sensitivity, and in an area of low topographic relief, to allow construction without the risk of a significant retrogressive landslide. Mr. Tavakkoli, who testified that he has experience with engineering tall structures in Leda clay, provided his opinion that the site-specific factors for the Project area would not give rise to a major risk of land instability and concluded that the Project was feasible from a foundation design perspective.

[302] Ms. Magee emphasized the need for a landslide hazard assessment to assess the potential impacts of the Project in respect of Leda clay and land stability, and the Tribunal has heard, through the evidence of Dr. Boone, that this type of assessment had commenced through field hydraulic and laboratory hydraulic conductivity testing. Mr. Tavakkoli provided recommendations regarding further testing, including a laboratory testing program and evaluation of the risk of landslide at each turbine site,

with additional boreholes to be drilled if necessary. Mr. Little confirmed that Mr. Tavakkoli's recommendations had guided the Approval Holder's geotechnical work done so far and the final geotechnical report would be done in consultation with the MECP, with Mr. Tavakkoli's recommendations as guidance and with his input if he is retained by the MECP.

[303] The Tribunal notes that Condition R of the REA requires the Approval Holder to submit a scope of work to the Director, for approval, for a supplementary detailed geotechnical investigation, which must then be completed, submitted and approved by the Director prior to the commencement of the construction of individual turbine foundations and access roads. The Tribunal is satisfied that the Approval Holder will consider the recommendations of Mr. Navakkoli in completing the work required under Condition R.

[304] With respect to the concerns about seismic evidence raised by the Appellant and Ms. Mekker, Ms. Magee testified that the Project area is within a seismic zone that experiences earthquakes, and that seismic shaking is felt more intensely in Leda clay areas and can lead to landslides. In response, the Tribunal heard opinion evidence from the Panel that, were a seismic event to occur, it would not heighten or exacerbate the Project's influences on the environment and, in particular, Dr. Boone testified that the Project turbines would not change seismic activity in the area, nor would they change the consequences of seismic activity. Furthermore, Mr. Tavakkoli testified that the potential for earthquakes is taken into account in the design process, based on the earthquake hazard maps and calculators prepared by Natural Resources Canada, which are available to engineers. The Tribunal is satisfied that the concerns about seismic activity highlighted by Ms. Magee are met by the opinion evidence tendered by the Approval Holder and the Director.

[305] Regarding flooding, Ms. Magee raised a concern that construction of the Project could exacerbate flooding due to a diminished capacity of the area around the turbines to absorb run-off and changes in groundwater level, but did not provide evidence in

relation to this concern. The Tribunal accepts the opinion evidence in response from Mr. Byerley, who testified that water would run off the concrete turbine foundations and into the ground, and that the Project would have no impact in this respect.

[306] Regarding the concern about responses to potential spills raised by Mr. Pethke, the Director referred the Tribunal to Condition H12 of the REA, which requires the Approval Holder to ensure that stormwater or runoff does not contain petrochemicals that could be detected, and Condition M1 requires that a spill containment facility be installed.

[307] Overall, on the basis of the evidence provided, the Tribunal accepts the opinion evidence brought by the Approval Holder and the Director regarding the various groundwater-related issues and finds that this evidence adequately addressed the concerns and evidence of the Appellant. Therefore, the Tribunal finds that the Appellant has not met the onus of proving that engaging in the Project in accordance with the REA will cause serious harm to human health, or serious and irreversible harm to plant life, animal life or the natural environment with respect to groundwater-related issues.

Conclusion

[308] As set out above, pursuant to s. 145.2.1(2) and (3), the Tribunal concludes that the Appellant has not met the onus of proving that engaging in the Project in accordance with the REA will cause serious harm to human health, or serious and irreversible harm to plant life, animal life or the natural environment.

DECISION

[309] The Tribunal dismisses the appeal by the Concerned Citizens of North Stormont and confirms the Director's decision to issue the REA in accordance with s. 145.2.1(5) of the *Environmental Protection Act*.

*Appeal Dismissed
Director's Decision Confirmed*

"Maureen Carter-Whitney"

MAUREEN CARTER-WHITNEY
VICE-CHAIR

Appendix 1 – Procedural Rulings

If there is an attachment referred to in this document, please visit www.elto.gov.on.ca to view the attachment in PDF format.

Environmental Review Tribunal

A constituent tribunal of Environment and Land Tribunals Ontario
Website: www.elto.gov.on.ca Telephone: 416-212-6349 Toll Free: 1-866-448-2248

Appendix 1**Procedural Rulings**

Over the course of the hearing, the Tribunal made a number of procedural rulings. These rulings are set out in this appendix.

Qualification of Vern Martin

Mr. Martin, a presenter in the proceeding, sought to be qualified as an expert witness in a number of areas, including turbo machinery, large industrial fans, industrial pumps and vibration analysis. He stated that the design concerns relating to large industrial fans were identical to those of wind turbines. He acknowledged that he was highly skeptical of wind power for both personal and professional reasons. He noted that he did not live in the Project area and was not being paid to testify.

The Approval Holder and the Director did not object to Mr. Martin giving a presentation to express his concerns but submitted that he did not meet the threshold for providing opinion evidence as an expert witness. They both took the position that, while Mr. Martin was a qualified engineer with experience doing risk assessments on industrial fans, he had never been involved in a public safety risk assessment for a wind energy project.

The Approval Holder and the Director also submitted that Mr. Martin had demonstrated bias in past writing and advocacy opposing wind projects, as shown in evidence introduced by the Approval Holder in cross-examining Mr. Martin, and therefore did not possess the independence to provide impartial, fair and objective expert testimony. The Approval Holder asked that, should the Tribunal qualify Mr. Martin, his qualification be limited to his engineering expertise in large industrial fans.

The Appellant took the position that Mr. Martin should be qualified as an expert witness, and that he had the specialized education, training and experience to be qualified in

accordance with the requirements to give opinion evidence set out at s. 5 of the Tribunal's *Practice Direction for Technical and Opinion Evidence* ("Practice Direction"). The Appellant noted Mr. Martin's decades of engineering experience with large industrial fans, which he testified were similar to wind turbines.

Regarding the concern that Mr. Martin was not impartial, the Appellant submitted that Mr. Martin believed he was able to provide fair, objective, non-partisan opinion evidence and had signed the Tribunal's Acknowledgement of Expert Duty form. The Appellant observed that Mr. Martin was not being paid, did not live near the Project area and had no personal interest in the matter. The Appellant referred to the Practice Direction, at s. 7, which states that expert witnesses must present evidence in an unbiased manner and not act as an advocate. The Appellant stated that nothing in the Tribunal's Rules or the Practice Direction forbids expert witnesses from having any personal opinions, noting that excluding opinion witnesses who have a personal opinion outside of their professional opinion would make the hearing process less accessible to communities looking for expert witnesses or to anyone seeking to be an expert witness. The Appellant asserted that evidence of Mr. Martin's personal opinions had been tendered by the Approval Holder, and was not what he would be relying on in his evidence at the hearing. The Appellant observed that the parties would have a later opportunity to make submissions as to the weight the Tribunal should ultimately give to his evidence, but that this should not have an impact on whether or not to qualify him as an expert witness.

The Tribunal qualified Mr. Martin to give opinion evidence as an engineer with expertise in large industrial fans. The Tribunal noted that its reasons for this disposition would follow, but made two observations to assist the parties in proceeding with Mr. Martin's evidence. The Tribunal stated that submissions regarding bias and advocacy would be assessed by the Tribunal when giving weight to the evidence, and further stated that Mr. Martin could speak to the areas for which he has been qualified and the Tribunal would assess the extent to which his opinions applied to the subject areas addressed in his witness statement. The Tribunal also reminded Mr. Martin that, in signing his

Acknowledgement of Expert's Duty, he had acknowledged, among other things, his duty to provide opinion evidence that is fair, objective and non-partisan.

The Tribunal's reasons for this disposition are as follows. There is no dispute about the fact that Mr. Martin has specialized education, training and experience as an engineer with significant expertise in large industrial fans. Notwithstanding his testimony that engineering principles relating to large industrial fans apply to wind turbines, Mr. Martin acknowledged that he does not have experience with industrial wind projects or expertise in risk assessment of wind turbines. As a result, his engineering expertise is founded upon and limited to his knowledge of large industrial fans.

While Mr. Martin has made public statements concerning his personal opinions about wind turbines, he has signed the Tribunal's Acknowledgement of Expert's Duty form and is aware of his duty to provide opinion evidence that is fair, objective and non-partisan. The Tribunal, therefore, finds that it is appropriate to qualify Mr. Martin to give opinion evidence as an engineer with expertise in large industrial fans. As noted above, the Tribunal will assess submissions concerning bias and advocacy when weighing Mr. Martin's evidence. Any such submissions may be addressed by the parties in their closing arguments.

Qualification of William Palmer

The Appellant sought to have Mr. Palmer qualified to provide opinion evidence regarding the application of engineering principles to risk and public safety assessment. Mr. Palmer is a professional engineer with experience and training in public safety and risk assessment who worked for many years in the nuclear energy generation sector. Mr. Palmer confirmed that he lives in proximity to numerous wind turbines, has appealed a proposed wind farm in the past, is a past member of Wind Concerns Ontario and has been active in publicly expressing his views about wind turbines.

Mr. Palmer has appeared as an expert witness in several previous renewable energy approval appeal hearings before the Tribunal. The Appellant submitted that the proposed qualification wording is similar to the way he was qualified in the matter of *Wrightman v. Ontario (Ministry of the Environment)*, [2014] O.E.R.T.D. No. 11 (“*Wrightman*”). While acknowledging that the wording of Mr. Palmer’s qualification was different in several more recent renewable energy approval appeal proceedings, the Appellant maintained that the wording in *Wrightman* was the most appropriate because it would reflect his experience not only with public safety risks due to turbine failure, but also with other public safety risks.

In the alternative, the Appellant proposed that Mr. Palmer be qualified as a professional engineer with expertise in public safety risks, including those due to turbine failure. The Appellant submitted that Mr. Palmer had been qualified to provide opinion evidence on public safety risks in previous hearings, and there was no basis to suggest that Mr. Palmer was not qualified to speak to public safety risks.

The Approval Holder did not oppose the Appellant’s request to qualify Mr. Palmer as an expert, with the caveat that it would be making submissions concerning weight with respect to Mr. Palmer’s anti-wind advocacy. However, it objected to the wording of the qualification requested and referred the Tribunal to the decisions in three renewable energy approval hearings subsequent to *Wrightman*, in all of which Mr. Palmer was qualified as a “professional engineer with expertise in public safety risks due to turbine failure”: *Kroeplin v. Ontario (Ministry of the Environment)*, [2014] O.E.R.T.D. No. 24 (“*Kroeplin*”); *East Oxford Community Alliance Inc. v. Ontario (Ministry of the Environment and Climate Change)*, [2015] O.E.R.T.D. No. 45 (“*East Oxford*”); and *Mothers Against Wind Turbines Inc. v. Ontario (Ministry of the Environment and Climate Change)*, [2015] O.E.R.T.D. No. 19 (“*MAWT*”). The Approval Holder noted that Mr. Palmer’s expertise in relation to other safety risks was primarily in the area of nuclear safety and not particularly relevant to the issues in this appeal. It submitted that there was no reason to deviate from qualifying Mr. Palmer in a manner consistent with the *Kroeplin*, *East Oxford* and *MAWT* proceedings.

The Director acknowledged Mr. Palmer's experience with turbine failure and had no objection to Mr. Palmer being qualified in some manner. However, while he recognized Mr. Palmer's expertise in aspects of public safety concerning turbine failure, the Director questioned the basis for qualifying Mr. Palmer with respect to risk assessments of turbine failure. The Director submitted that Mr. Palmer's experience in risk assessment was within the fields of hydroelectric and nuclear energy, and that the information provided about Mr. Palmer's expertise did not indicate if it could be transplanted to the wind turbine context.

The Tribunal qualified Mr. Palmer to give opinion evidence as a professional engineer with expertise in public safety risks due to turbine failure, with reasons to follow.

The Tribunal's reasons for qualifying Mr. Palmer in this manner are as follows. The Tribunal took into consideration the language used to qualify Mr. Palmer in past renewable energy approval appeal proceedings. While Mr. Palmer was qualified using broader language in the *Wrightman* matter, to provide opinion evidence regarding the "application of engineering principles to risk and public safety assessment", the language used to qualify him in three subsequent matters was narrowed to "a professional engineer with expertise in public safety risks due to turbine failure." Although Mr. Palmer has developed expertise on public safety risks relating to nuclear safety, the Tribunal finds that such expertise is not relevant to the issues before it in this matter. For the same reason, the Tribunal declines to qualify Mr. Palmer in the alternate wording proposed by the Appellant, as a professional engineer with expertise in public safety risks, including those due to turbine failure.

Regarding the Director's concerns about whether Mr. Palmer's expertise in risk assessment could be transferred to the context of wind turbines, the Tribunal notes Mr. Palmer has taken courses that address risk assessment methods, relating to both deterministic and probabilistic risk assessment, and has developed expertise in applying these risk assessment methods in his years of employment in the nuclear energy

generation sector. The Tribunal is satisfied that Mr. Palmer has the education and expertise to provide opinion evidence on the application of these risk assessment methods to turbine failure.

Therefore, the Tribunal finds it appropriate to adopt the qualification wording proposed by the Approval Holder, consistent with the way in which Mr. Palmer was qualified in the *Kroeplin, East Oxford* and *MAWT* matters, as a professional engineer with expertise in public safety risks due to turbine failure. As with Mr. Martin, the Tribunal will assess submissions concerning bias and advocacy when weighing Mr. Palmer's evidence and any such submissions may be addressed by the parties in their closing arguments.

Supplementary witness statements

The Appellant raised three related issues with the Tribunal:

- the Appellant objected to supplementary witness statements introduced by the Approval Holder in response to some of the participant and presenter witness statements, on the basis that they were raising new issues at a late date and not in accordance with the Tribunal Rules;
- the Approval Holder objected to the supplementary witness statements of Ian Reveler and Julia Cyr, put in by the Appellant; and
- the Appellant objected to the proposal by the Approval Holder and the Director that they would seek opportunities during the hearing to provide sur-reply evidence to the supplementary witness statements of Mr. Reveler and Ms. Cyr.

The Tribunal provided an oral disposition at the hearing, with reasons to follow, allowing into evidence the supplementary witness statements submitted by both the Appellant and the Approval Holder. The Tribunal directed that witnesses could then respond to evidence in these supplementary witness statements during their oral testimony at the hearing, noting that the Appellant would have the opportunity to bring limited reply

evidence, in accordance with the principles of reply evidence set out in *Tomagatick v. Ontario (Ministry of the Environment)*, [2009] O.E.R.T.D. No. 3 (“*Tomagatick*”), at para. 38 (“*Tomagatick*”).

The Tribunal’s reasons for this ruling are as follows.

Regarding the Appellant’s supplementary witness statements, the Tribunal finds that its Timeline does allow for an appellant to provide supplementary witness statements from new witnesses in reply. The Timeline states that an appellant’s reply documents to be relied on at the hearing are due within eight weeks after the appeal expiry date. The documents that an appellant is to serve on the other parties by this date include the following:

- list of any supplementary witnesses who will be providing reply evidence;
- witness statement for each supplementary witness who will be providing reply evidence;
- supplementary witness statement for any previously identified witness who will be providing reply evidence; ...

This list indicates that supplementary witnesses may be introduced by an appellant in order to provide reply evidence. The principles of reply evidence have been addressed in previous Tribunal decisions, including *Tomagatick*, as noted by the Approval Holder.

At para. 38 of *Tomagatick*, the Tribunal stated that

...an applicant in reply may not raise issues it could have raised earlier or address issues that do not flow directly from a response. Otherwise, this would allow an applicant to split its case. If the Director and the Instrument Holder are not then given an opportunity to respond to these new issues and evidence, it could be unfair to them....

The Tribunal finds that the Appellant’s supplementary witness statements do address issues that flow from the respondents’ witness statements. Notwithstanding the Approval Holder’s submission that new evidence in the supplementary witness

statements of Mr. Reveler and Ms. Cyr could have been provided earlier, it consents to the introduction of these witness statements so long as its witnesses have an opportunity to respond in their oral evidence. The Tribunal finds this to be a fair and reasonable way to proceed.

Regarding the Approval Holder's supplementary witness statements, the Tribunal also finds that they should be accepted into evidence. The Tribunal did grant an extension to July 12 for Mr. Pethke's presentation, making it impossible for the Approval Holder to respond to his evidence on July 11. The Appellant conceded in its submissions that the responses to Mr. Pethke's evidence in the Approval Holder's supplementary witness statements should be permitted as a result of the extended deadline for his presentation.

The Tribunal also accepts the Approval Holder's responses to Mr. Martin's evidence in its supplementary witness statements. Given the tight schedule for disclosure of witness statements in this proceeding, it would have been challenging for the Approval Holder to respond to Mr. Martin's technical evidence on July 11, one day after his presentation was due. As a result, the July 10 Schedule allowed for the respondents to respond to presentations by July 17. The Tribunal was present for the July 11, 2018 TCC, during which the Appellant did consent to the July 10 Schedule, subject to several caveats that were subsequently addressed. These caveats related to the availability of certain witnesses and the use of Skype or other electronic means to allow them to appear at the hearing, as well as possible revisions of the schedule if needed by the Appellant after receiving the Approval Holder's witness statements.

As with the Approval Holder's witnesses, the Tribunal will permit the Appellant's witnesses to provide reply to the evidence in the Approval Holder's supplementary witness statements during their oral testimony. The Tribunal finds that this will address any potential prejudice to the Appellant.

Qualification of Marc LeBlanc

The Approval Holder initially sought to have Marc LeBlanc qualified as an engineer with expertise in the development, construction and operation of wind farms including risk and public safety assessment. Mr. LeBlanc is a licensed mechanical engineer who has worked in risk assessment in the wind energy industry for approximately 16 years. He is the author of a report on recommendations for risk assessments of ice throw and blade failure, which is accepted as a standard reference document in the renewable energy industry. It submitted that Mr. LeBlanc had been involved in all aspects of wind project development from inception to operation, including the entire life cycle of wind turbines. The Approval Holder submitted that, while Mr. LeBlanc had specific experience in blade failure and ice throw, he also had broader experience in risk assessments at all stages of wind project development.

The Appellant did not object to Mr. LeBlanc being called as an opinion witness but took the position that the proposed qualification was worded too broadly in its reference to expertise in the development, operation and construction of wind farms. While the Appellant acknowledged that Mr. LeBlanc had familiarity with these areas, it submitted that it would be overly broad to state that he was an expert in all of them. The Appellant proposed that it would be more appropriate to qualify Mr. LeBlanc as an engineer with expertise in ice throw and wind turbine failures.

Having considered the other parties' submissions, the Approval Holder revised the proposed qualification sought and asked the Tribunal to qualify Mr. LeBlanc as an engineer with expertise in risk and public safety assessment in the context of the development, construction and operation of wind farms. However, the Appellant maintained its position that it would be more appropriate to limit Mr. LeBlanc's qualification to that of an engineer with expertise in ice throw and blade failures.

The Tribunal provided an oral disposition at the hearing, with reasons to follow, qualifying Mr. LeBlanc as an engineer with expertise in risk and public safety

assessment in the context of the development, construction and operation of wind farms.

The Tribunal's reasons for this ruling are as follows.

The Tribunal reviewed Mr. LeBlanc's oral testimony concerning his qualifications and experience, as well as his witness statement and *curriculum vitae*. In addition to his education, which includes Bachelor's and Master's degrees in mechanical engineering, the Tribunal is satisfied that the following experience demonstrated by Mr. LeBlanc supports his qualification as an engineer with expertise in risk and public safety assessment in the context of the development, construction and operation of wind farms:

- he has been involved in the comprehensive review and assessment of technical risk related to wind projects over the entire lifecycle of project development, construction and operation during 16 years of employment in the wind energy industry;
- as an engineer in the Energy Group at Garrad Hassan & Partners Ltd, he was responsible for computational site wind flow calculations, correlation analyses, extreme wind predictions, and micro-siting;
- as a Senior Engineer in the Energy Group at Garrad Hassan & Partners Ltd, he managed and directed project assessments of wind projects in Canada, France and Japan;
- as a Principal Engineer and Managing Director at Garrad Hassan Canada, he was responsible for managing and conducting due diligence reviews, energy production assessments, risk assessments and other development services for wind farms in Canada;
- as Vice President – North American and Department Head – Operations & Asset Management, he was responsible for managing and approving operational services including operational monitoring;

- in his current role as Senior Project Manager, Due Diligence at DNV GL, he has been responsible for management of the technical due diligence of wind farms in construction and operation in North America; and
- throughout his career, he has conducted or managed many ice and/or blade throw risk assessments with an emphasis on public safety, and many turbine site suitability reviews.

Qualification of Angelique Magee

The Appellant sought to have Ms. Magee qualified as an expert environmental scientist specializing in multidisciplinary science integration in environmental assessment with knowledge and experience in groundwater contamination and geological analysis.

Ms. Magee holds a B.Sc.(Hons) in Geology from Carleton University and has completed four earth sciences Master's-level courses in a M.Sc. Geology program at Lakehead University, but has not completed that degree. Since 2012, Ms. Magee has been employed as a Senior Environmental Assessment Officer with the Government of Canada Office of the Chief Scientist's Environmental Assessment Division. Over the past 20 years, she has held a number of other positions, including in recent years: Section Head, Geoscience Integration and Analysis Section and Earth Materials Collections, Land and Minerals Sector, Natural Resources Canada; Curator of Hard Rocks, Ores and Minerals/Senior Officer/Building Emergency Officer, Earth Sciences Sector, Mapping Information Branch, Natural Resources Canada; Science Liaison Coordinator, Earth Sciences Sector, with the Coordination and Strategic Issues Branch and Polar Continental Shelf Program, Natural Resources Canada; and GIS and Technical Support Scientist, Geological Survey of Canada.

Ms. Magee provided a detailed review of her project experience, particularly regarding her work conducting and contributing to environmental assessments that involve the multidisciplinary integration of science in environmental impact assessment to support major project decision making through a variety of legislative processes. She

acknowledged that she is not a hydrogeologist and confirmed that experts with hydrogeology expertise may be involved in multidisciplinary teams conducting environmental assessments as appropriate.

The Tribunal qualified Ms. Magee to provide expert opinion evidence as an environmental scientist specializing in multidisciplinary science integration in environmental assessment. The Tribunal also qualified Ms. Magee to provide technical evidence as a technical witness, based on her knowledge and experience in groundwater contamination and geological analysis.

The Tribunal provided the following reasons orally at the hearing:

I have had an opportunity to further review Ms. Magee's witness statement and qualifications, as well as the evidence and submissions heard by the Tribunal yesterday concerning her request to be qualified. She described herself yesterday as a senior environmental assessment officer with a background in geology. She stated that, in her role of conducting environmental assessments as part of teams of multidisciplinary scientists, she would at times work with and review the work of experts with expertise in specific areas, such as professional engineers, seismologists, landslide experts, and hydrogeologists. She did not put herself forward as having any of those specific areas of expertise.

On that basis, I have qualified her as stated.

Subsequent to that finding, discussions took place regarding the possible need for Ms. Magee to become a registered member of the Association of Professional Geoscientists of Ontario ("APGO"), established by s. 27 of the *Professional Geoscientists Act, 2000* ("PGA"). In this regard, a previous Tribunal decision was cited, *Trent Talbot River Property Owners Assn. v. Ontario (Ministry of Environment)*, [2005] O.E.R.T.D. No. 42 ("Trent Talbot"), in which a similar situation arose during the hearing.

Adjournments of the hearing of the groundwater issue

The Tribunal granted an adjournment to August 20, 2018 to permit Ms. Magee and the Appellant to clarify the need for registration. The adjournment did not exclude the

adjournment period from the calculation of the six months under s. 59(2) of O. Reg. 359/09.

The Tribunal's reasons for this disposition are as follows.

The Tribunal finds that the hearing of the remaining evidence on the groundwater issue should be adjourned in order to provide Ms. Magee with an opportunity to pursue registration by the APGO under the *PGA*. As a key witness called by the Appellant on the groundwater issue, Ms. Magee's evidence is significant to its case. She is the only witness that the Appellant has sought to qualify to provide opinion evidence on this issue.

Given the indication by the APGO that it should be able to consider and make a decision on Ms. Magee's application by August 20, 2018, it is reasonable to grant an adjournment to allow it to do so. Therefore, the Tribunal adjourns the hearing of the groundwater evidence until a teleconference call on August 20, 2018 at which time we will establish whether or not Ms. Magee has achieved her registration.

By email dated Aug. 21, 2018, the Tribunal revised its oral disposition of July 31, 2018, concerning the adjournment of the remaining groundwater evidence in this matter, on consent of the parties, to extend the date by which Ms. Magee is to confirm whether or not she has achieved registration by the APGO to the end of the day on August 24, 2018.

The Appellant made a motion for a further extension of time on August 27, 2018.

The Appellant asked that the hearing be adjourned to allow for Ms. Magee's application to be considered by the APGO review committee, scheduled to meet during the second week of September.

On August 28, 2018, the Tribunal issued the following order in writing:

[1] With reasons to follow, the Environmental Review Tribunal (“Tribunal”) adjourns the hearing on its own initiative, under Ontario Regulation 359/09, s. 59(2)1.ii, for a period of 44 days (i.e., the period of time between the telephone conference call (“TCC”) held on August 27, 2018 and a TCC to be held at 10 a.m. on October 11, 2018).

[2] Subject to any further order by the Tribunal, the date of deemed confirmation of the Renewal Energy Approval (“REA”) if the Tribunal has not disposed of the hearing, is January 5, 2019.

[3] The Tribunal directs the Appellant to advise the Tribunal and other parties as soon as possible of any developments with respect to the circumstances that gave rise to this adjournment.

[4] The Tribunal directs the parties to provide written closing submissions on the health and wildlife issues in this matter, according to the REA appeal schedule previously established. According to this schedule, the following dates apply for outstanding submissions: September 11, 2018 for the Respondents’ written submissions and September 18, 2018 for written reply submissions. All other dates in the appeal schedule are vacated.

[5] The Tribunal directs the parties to establish a proposed revised schedule for the completion of the hearing of the groundwater evidence, the written submissions on that issue and the closing oral submissions. The hearing of the groundwater evidence is to be completed by October 31, 2018. The Tribunal is generally available after October 11, 2018, with the exception of October 23 and 24, 2018. The Tribunal directs the parties to provide the Tribunal with the proposed revised schedule by October 1, 2018.

The Tribunal’s reasons for its August 28, 2018 order are as follows.

In its oral disposition on July 31, 2018, the Tribunal adjourned the hearing to allow Ms. Magee until August 20, 2018 (later extended on consent of the parties to August 24, 2018) to ascertain whether she would be able to attain registration with the APGO under the *Professional Geoscientists Act*. This disposition was based on the information provided to the Appellant by the APGO at that time, which indicated that the APGO’s registration committee would meet to consider her application on or before August 20, 2018.

On July 31, 2018, the Tribunal also made a procedural direction that, if Ms. Magee did not attain her registration by August 20, 2018, it would proceed to hear any outstanding evidence that the responding parties wished to call, to be completed by September 13, 2018.

The Tribunal has now been informed that Ms. Magee's application for registration has not yet been considered by the APGO's registration committee. The information now being provided to the Tribunal indicates that this is anticipated to occur by mid-September.

The Approval Holder takes the position that the Appellant is seeking a reconsideration of an order by the Tribunal, pursuant to Rules 235 to 242 of the Tribunal's Rules, and points out that Rule 243 specifically provides that Rules 235 to 242, concerning requests for review, do not apply to renewable energy approval appeal proceedings under s. 142.1 of the *EPA*. The Tribunal agrees with the Approval Holder that Rule 243 provides that requests for review or reconsideration are not applicable to renewable energy approval appeals.

However, in the Tribunal's view, the Appellant's adjournment request is not a request for a review of an order by the Tribunal, as contemplated by Rules 235 to 242. Instead, the Tribunal finds that the Appellant is asking for a further adjournment as a result of a change in circumstances and, therefore, asking the Tribunal to revise procedural directions arising from its July 31, 2018 oral disposition.

The Tribunal's July 31, 2018 disposition was based on the Appellant's understanding that the APGO would have had an opportunity to consider and make a determination on Ms. Magee's application by August 20, 2018. As noted in its reasons above for that disposition, the Tribunal directed that any outstanding evidence would be completed by September 13 in order to indicate that it would not provide additional time to allow Ms. Magee to amend or add to her application, if it were denied by the APGO. The Tribunal made this and other procedural directions at that time, based on the

information available, to attempt to avoid needing to exclude the adjournment period from the calculation of the six months in the proceeding. It appeared to the Tribunal that, having made these procedural directions, it could allow Ms. Magee's APGO application either to be approved or refused while ensuring sufficient time to complete the evidence, submissions and decision writing by November 22, 2018.

As the Appellant advised on August 23, 2018, the APGO review committee meeting scheduled for August was not held and the next meeting was not scheduled to take place until mid-September. Therefore, Ms. Magee's application has not yet been considered, and the purpose of the initial adjournment has not been met. Due to this change in circumstances, the Tribunal has received submissions from the parties and decided to once again adjourn the matter, for the reasons discussed in more detail below. This has resulted in the Tribunal revising its earlier procedural directions. That happens regularly in Tribunal proceedings, particularly in those that are lengthy and complex and, as the Appellant pointed out, occurred recently when the Tribunal (on consent) extended the due date for the Appellant to confirm Ms. Magee's status with the APGO, from August 20 to 24.

Even if the Tribunal's reconsideration rules (Rules 235-243) did apply in this renewable energy approval appeal, they are not intended to apply to procedural directions issued by Tribunal during a proceeding as that would not allow the Tribunal any scope to adjust its process as a hearing is proceeding. Over the course of a hearing, the Tribunal will often need to revise procedural directions that it has given earlier in the proceeding. This is particularly true in fast-moving renewable energy approval appeal proceedings that are to be completed within a statutory timeframe. The Tribunal controls its own process and, when circumstances change, the Tribunal must be able to revisit its earlier procedural directions and adjust them as necessary. In this case, the Tribunal's July 31 procedural direction, made on the basis that Ms. Magee would be informed one way or the other regarding her registration application in August, was intended to provide guidance to parties regarding dates going forward in order to avoid excluding the adjournment period from the calculation of the six months in this proceeding.

Regarding the parties' submissions concerning *Trent Talbot*, it is an example of a similar situation arising in that matter and the two decisions relating to *Trent Talbot* provide some guidance in how the Tribunal dealt with that situation at that time. However, these decisions have no precedential value and, as indicated by counsel, the facts are somewhat different in this proceeding. As set out below, the Tribunal's disposition is made in the context of the circumstances of the matter before it.

In considering an adjournment request, the Tribunal looks to the factors set out in Rule 105 of the Tribunal rules:

105. In deciding whether or not to grant a request for an adjournment, the Tribunal may consider:
 - (a) the interests of the Parties in a full and fair Hearing;
 - (b) the interests of others potentially affected by the matters before the Tribunal who, after notification of the Hearing, may have arranged their affairs in the expectation of observing or participating in the Hearing;
 - (c) the integrity of the Tribunal's process;
 - (d) the circumstances giving rise to the need for an adjournment;
 - (e) the timeliness of the request for the adjournment;
 - (f) the position of the other Parties on the adjournment request;
 - (g) whether an adjournment will cause or contribute to any existing or potential risk of environmental harm;
 - (h) the consequences of an adjournment, including expenses to other Parties;
 - (i) the effect of an adjournment on Participants and Presenters;
 - (j) the public interest in the delivery of the Tribunal's services in a just, timely and cost effective manner; and
 - (k) whether the proceeding before the Tribunal is an appeal of a renewable energy approval under section 142.1 of the *Environmental Protection Act*.

The circumstances giving rise to the need for the adjournment requested by the Appellant are set out above. The July 31 adjournment was granted on the basis that Ms. Magee would be advised as to whether her application for registration under the PGA was successful following the August APGO review committee meeting. That meeting did not occur and she has now been informed that her application will not be

considered until the middle of September, following the dates set for the resumption of the hearing. As a result of this change in circumstances, the Appellant seeks a further adjournment. The Appellant has made this request for a further adjournment in a timely manner, advising the Tribunal and the other parties as soon as possible after learning that Ms. Magee's application was not considered.

The Tribunal finds that several of the factors in Rule 105 weigh heavily towards providing the Appellant with the requested adjournment: the interests of the parties in a full and fair hearing; the integrity of the Tribunal's process; and the public interest in the delivery of the Tribunal's services in a just, timely and cost effective manner.

Ms. Magee is an important witness for the Appellant on its groundwater issue. The Appellant was led to believe that consideration of Ms. Magee's application for APGO registration would be considered in August; the fact that this did not happen was not in the Appellant's control.

Notwithstanding the responding submissions that APGO registration may not be necessary because of Ms. Magee's qualification as a technical witness in respect of certain areas of her proposed evidence, Ms. Magee has indicated that she will not be able to provide most of the evidence in her witness statement if she is not registered as a professional geoscientist. In addition, on July 31, 2018 the Tribunal was advised that the APGO had confirmed that Ms. Magee was required to be registered with the APGO as a geoscientist to give an opinion on geoscience in public. In addition to qualifying Ms. Magee to give technical evidence on groundwater contamination and geological analysis, the Tribunal also qualified her to provide expert opinion evidence as an environmental scientist specializing in multidisciplinary science integration in environmental assessment. To the extent that Ms. Magee intends to testify about geoscience in her opinion evidence, her registration by the APGO may be required.

It appears, therefore, that Ms. Magee may only be in a position to testify if she is registered as a professional geoscientist and so a further adjournment is necessary to determine if she will achieve this registration. It is in the interest of a full and fair hearing

and in the public interest to allow the Appellant to ascertain whether or not Ms. Magee's application to do so will be approved, and the integrity of the Tribunal's process requires that the Appellant be given one further opportunity to seek her registration.

The Tribunal has considered the position of the other parties on the adjournment request and the consequences of the adjournment, and acknowledges that a delay of several more weeks may pose additional costs for the Approval Holder. The Tribunal also acknowledges the Director's submission that it is inconvenient to reschedule witnesses once again in respect of this proceeding. However, given that the remaining hearing dates are currently scheduled for September 10 to 12, 2018, approximately two weeks from now, the parties have sufficient notice of the requested further adjournment to reschedule their witnesses without undue financial consequences. The Tribunal is of the view that adjournment requested is not lengthy and is therefore appropriate in the context of this proceeding being an appeal of a renewable energy approval under s. 142.1 of the *EPA*.

There were no submissions to the Tribunal addressing concern about any adverse effects from the adjournment on the presenters or participant, or that the adjournment would cause or contribute to any existing or potential risk of environmental harm. The Tribunal is satisfied that neither of these factors is relevant to this adjournment request.

After weighing the factors in Rule 105, the Tribunal finds in favour of granting the requested adjournment of the hearing for an additional period of time to allow for Ms. Magee's application for registration to be considered by the APGO's registration committee.

Having determined that the adjournment should be granted, the Tribunal now turns its mind to whether it should exclude the adjournment period from the calculation of the six months in this proceeding. The Tribunal is satisfied that it had been provided with the information required to determine on its own initiative whether to exclude any period of time from the calculation of the prescribed six months under s. 59 of O. Reg. 359/09:

59. (1) Subject to subsections (2) and (3), the prescribed period of time for the purposes of subsection 145.2.1(6) of the Act is six months from the day that the notice is served upon the Tribunal under subsection 142.1(2) of the Act.

(2) For the purposes of calculating the time period mentioned in subsection (1), any of the following periods of time shall be excluded from the calculation of time:

1. Any period of time occurring during an adjournment of the proceeding if,
 - i. the adjournment is granted by the Tribunal on the consent of the parties, or
 - ii. the adjournment is,
 - A. On the initiative of the Tribunal or granted by the Tribunal on the motion of one of the parties,
 - B. Not being sought for the purpose of adjourning the proceeding pending the resolution of an application for judicial review, and
 - C. Necessary, in the opinion of the Tribunal, to secure a fair and just determination of the proceeding on its merits.

As set out in s. 59(2).1.ii of O. Reg. 359/09, any period of time during an adjournment of the proceeding shall be excluded from the calculation of the six-month time period if the adjournment is on the initiative of the Tribunal or on consent of the parties, it is not for the purpose of adjourning pending resolution of an application for judicial review, and it is “necessary, in the opinion of the Tribunal, to secure a fair and just determination of the proceeding on its merits.”

Adjournments, on the Tribunal’s initiative, which exclude the adjournment period from the calculation of the six months under s. 59(2) of O. Reg. 359/09, have been used in several recent renewable energy approval appeals for a number of reasons, such as allowing the parties to fully present their respective cases and ensuring that the Tribunal would have sufficient time to deliberate on the evidence and submissions.

In this case, as in those, the Tribunal is satisfied that the test in s. 59(2).1.ii of O. Reg. 359/09, that an adjournment is necessary to secure a fair and just determination of the proceeding on its merits, is met. The Tribunal finds that an adjournment is necessary to provide the Appellant with an opportunity to have Ms.

Magee's application for registration considered by the APGO registration committee, given that she is the Appellant's main witness on the groundwater issue and her evidence is integral to the Tribunal's determination of that issue on its merits. This requires the exclusion of the adjournment period from the calculation of the six months under s. 59 of O. Reg. 359/09.

In order to provide sufficient time for Ms. Magee's application to be assessed at the APGO's September committee meeting, and for any needed revisions to her witness statement to be made, as a consequence of that committee's decision, and provided to the other parties, the Tribunal adjourns the hearing to a TCC on October 11, 2018, a date previously set aside for hearing oral submissions in this matter and therefore available to all counsel.

To ensure that this proceeding continues to move forward during this adjournment, the Tribunal directs the parties to provide written closing submissions on the health and wildlife issues in this matter, according to the July 10 Schedule, and directs the parties to establish a proposed revised schedule for the completion of the hearing of the groundwater evidence, the written submissions on that issue and the closing oral submissions.

Appellant's motion to dispense with written closing submissions

On August 10, 2018, the Appellant filed a notice of motion for an order dispensing with written closing submissions and amending the hearing schedule to reflect the removal of written closing submissions. Both the Approval Holder and the Director opposed the motion.

The Tribunal convened a TCC for August 14, 2018 in order to hear the motion in an expeditious manner.

The Tribunal provided the following disposition on August 15, 2018, with written reasons to follow:

The Tribunal dismisses the Appellant's motion and directs the parties to provide written closing submissions on the health and wildlife issues in this matter, according to the Renewable Energy Approval appeal schedule previously established. According to this schedule, the following dates apply: August 21, 2018 for the Appellant's written submissions; September 11, 2018 for the Respondents' written submissions and September 18, 2018 for written reply submissions.

The schedule for written closing submissions on the groundwater issue will be established to follow the hearing of the remaining evidence on that issue, which is scheduled to be heard commencing September 10, 2018. The Tribunal directs the parties to discuss and provide to the Tribunal, by August 24, 2018, a proposed schedule for written closing submissions on the groundwater issue and a proposed date in early October 2018 for oral submissions.

The Tribunal further directs the parties to adhere to a maximum page limit of a total of 60 pages for their written closing submissions. As discussed during the TCC, each party may determine how many pages, of the 60-page total, to devote to each issue.

There is no minimum page limit and parties may choose to provide fewer than 60 pages of written closing submissions.

The Tribunal's reasons are as follows.

The Tribunal accepts that engaging in a proceeding such as this is costly for the Appellant. As in many past Tribunal proceedings, unexpected events have arisen that have increased the cost of litigation. The adjournment of this matter is an example of such an unexpected event. However, as noted in the Tribunal's reasons for its previous disposition in this matter, it was the responsibility of the Appellant's counsel to ensure

that Ms. Magee had the proper professional registration to provide her intended evidence for the Appellant. It was not the responsibility of counsel for the responding parties and it is inappropriate to blame them for the additional costs related to the adjournment to allow Ms. Magee an opportunity to obtain APGO registration.

Notwithstanding the additional costs to the parties resulting from the adjournment, it is the Tribunal's view that dispensing with written submissions would not benefit any of the parties, including the Appellant and, furthermore, would not assist the Tribunal. Particularly in the context of the accelerated timeframe of a complex renewable energy approval proceeding, written submissions are of great value to the Tribunal.

In its July 31, 2018 decision on the Appellant's request to adjourn the remaining groundwater evidence decision in respect of Ms. Magee's APGO status, the Tribunal specifically noted that it would be receiving written closing submissions on the health and wildlife issues for which evidence was complete. The Tribunal's expectation that the parties would proceed with providing written submissions on these issues was a factor in its decision granting the adjournment.

Rule 184 of the Tribunal Rules provides that the Tribunal may allocate the time permitted for the making of submissions. In the Tribunal's view, the most effective and efficient use of the limited time available in hearing the appeal of this REA is to proceed with written submissions as previously agreed to by the parties on the schedule to which they have previously consented.

However, the Tribunal understands the Appellant's concerns about the financial burden of this hearing. To address these concerns, the Tribunal will impose a page limit of 60 pages on the written closing submissions of each party. The Tribunal finds that this is a reasonable length given the number and complexity of issues in this matter. Noting that the groundwater evidence has not yet been completed, the Tribunal leaves it to each party to determine how many pages, of the 60-page total, to devote to the discussion of each issue. The Tribunal also notes that there is no minimum page

requirement and parties may decide to provide fewer than 60 pages of written closing submissions.